Vol. 20. No. 3. pp. 127-186 March, 1950
Abstracts 552-826

THE VETERINARY BULLETIN

1950

COMMONWEALTH BUREAU OF ANIMAL HEALTH
WEYBRIDGE, SURREY
ENGLAND

20 JUL 1950

Price 5/- net

Annual Subscription £2

Commonwealth Agricultural Bureaux.

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THE

VETERINARY BULLETIN

Vol. 20.] March, 1950. [No. 3.

DISEASES CAUSED BY BACTERIA AND FUNGI

BERNHEIMER, A. W. (1949.) **Formation of a bacterial toxin (streptolysin S) by resting cells.**—*J. exp. Med.* **90.** 373–392. [Author's summary copied *verbatim.*] **552**

The interaction of washed cocci, prepared under specified conditions, and a polynucleotide (AF) results in the formation of streptolysin S provided a fermentable carbohydrate is present. Maximum toxin formation requires, in addition the presence of magnesium, potassium, and phosphate ions. Streptolysin S production proceeds anaerobically as well as aerobically but under the latter condition, apparently only if the system is sufficiently reducing. Temperature has a marked effect on the rate of appearance of toxin, the critical thermal increment having a value of approximately 36,000. The formation of streptolysin S is inhibited by mercuric ion, arsenite, iodoacetate, dinitrophenol, azide, and other enzyme poisons. The development of streptolysin S in resting cell systems depends neither upon autolysis nor upon physical extraction of preformed toxin but upon toxin synthesis.

From the supernatant fluid of the resting cell system, a product containing 20,000 to 30,000 units of streptolysin S per mg. dry weight can be isolated. Information concerning the pH stability of the product is presented. The product is free of streptokinase, hyaluronidase, and proteinase, but possesses appreciable desoxyribonuclease activity. Chemical analyses and other findings indicate that polynucleotide and carbohydrate are present in major amount, and that a small but undetermined quantity of protein is present. Inactivation of streptolysin S by chymotrypsin, ficin, papain, or cathepsin, and not by a variety of other enzymes, indicates that protein is essential for activity, but the precise chemical composition of the toxin remains to be established.

ERIKSEN, K. R. (1948.) **Acquired penicillin resistance in pathogenic cocci.**—*Acta path. microbiol. scand.* **25.** 249–253. Discussion pp. 253–254. [In English.] **553**

A general account of the acquirement of resistance to penicillin by pneumococci, streptococci and staphylococci, *in vitro* and *in vivo*. This resistance was increased up to 60 times and the virulence of the strains was lowered considerably after daily transfers *in vitro* over a period of two months and was restored by comparatively few mouse passages. The sensitiveness to sulphonamides was not affected by acquirement of penicillin resistance. The development of resistant strains by mutation or adaptation is discussed briefly.—MALCOLM WOODBINE.

INESON, P. J., & CUNNINGHAM, A., dec'd. (1949.) **Investigations on bovine mastitis. 4. The association of new infections caused by *Streptococcus agalactiae* with (a) season and (b) stage of lactation.**—*J. Dairy Res.* **16.** 139–148. [Authors' summary copied *verbatim.*] **554**

Regular testing at 3-monthly intervals for periods extending to 7 years of some 650 to 850 cows in fourteen herds indicated that the majority of the new infections caused by *Str. agalactiae* were recorded in the autumn months, August, September and October. When infections were considered in relation to the stage of lactation, although higher new infection values were recorded at the first test after calving than at later stages, the differences were not statistically significant.

SPENCER, G. R., KRAFT, M. E., & UNDERBJERG, G. K. L. (1947.) **Efficacy of intramammary infusion with penicillin and diluents on streptococcic mastitis.**—*Amer. J. vet. Res.* **8.** 325–329. **555**

The therapeutic results yielded by an emulsion of mineral oil and 10% water indicated that it was a more efficient carrier for penicillin, given either as one dose of 50,000 units or three doses of 15,000 units, than either distilled water or peanut oil. The mineral oil emulsion and aqueous solution caused more irritation to the udder than did the peanut oil suspension, but the inflammation was of short duration.—J. I. TAYLOR.

ZWEIG, J. (1949.) **Procaine penicillin G in the bovine udder.**—*Vet. Rec.* **61.** 811–813. [Author's summary copied verbatim.] **556**

The activity of procaine penicillin G in arachis oil and aluminium stearate, its prolonged

action and more efficient utilisation in the parenchyma of the udder are discussed. The penicillin concentration was found to be inversely related to the milk yield. Experimentally, it was possible to produce a sharp fall in penicillin levels in some individual quarters by injection of penicillinase-producing bacteria. Their possible origin is discussed.

GAULD, R. L., SCHLINGMAN, A. S., JACKSON, E. B., MANNING, M. C., BATSON, H. C., & CAMPBELL, C. C. (1949.) **Chloramphenicol (chloromycetin) in experimental cholera infections.**—*J. Bact.* **57.** 349–352. [Authors' summary copied *verbatim.*] **557**

Chloromycetin is an effective antibiotic for the treatment of mice experimentally inoculated with *Vibrio comma* when given in adequate doses between 1 hour before and 2 hours after the injection of the organisms. The possible usefulness of the drug as a chemoprophylactic agent among human contacts of cholera is suggested.

CANHAM, A. S. (1948.) **Vibrio foetus infection in cattle.**—*J. S. Afr. vet. med. Ass.* **19.** 103–104. **558**

A number of outbreaks were investigated since 1939; features common to these outbreaks were that the losses of calves were less than occur in outbreaks of contagious abortion and that the disease died out fairly rapidly without special treatment. A typical outbreak is described. Abortions occurred between the fourth and seventh months. All cows which aborted retained the placenta and had a whitish discharge for periods up to a month. After recovery they generally held to first service and gave birth to healthy calves. Diagnosis was by identification of the organism in the stomach contents of an aborted foetus.

The disease is considered to be fairly widespread in Natal and other parts of the Union of South Africa.—M. C.

JOHNSON, F. H., & ZOBELL, C. E. (1949.) **The retardation of thermal disinfection of *Bacillus subtilis* spores by hydrostatic pressure.**—*J. Bact.* **57.** 353–358. [Authors' summary copied *verbatim.*] **559**

Spores of *Bacillus subtilis*, suspended in buffered salt solution, pH 7·0, slowly lose their viability at 25 C, and this decrease in viability is accelerated by a hydrostatic pressure of 600 atmospheres. During short periods of compression, the rapidity of decompression or repeated subjection to pressure has no appreciable influence on viability.

At 92·5 C or 93·6 C, corresponding suspensions rapidly lose their viability, but this loss is retarded by a hydrostatic pressure of 600 atmospheres. The rate of decrease in the number of viable spores does not conform to the kinetics of a first order reaction but exhibits a pronounced lag. In greatly diluted salt solution, disinfection at these temperatures is much faster and the lag less pronounced, but pressure retards the rate and the shape of the curves is generally similar.

I. HANBY, W. E., & RYSON, H. N. (1946.) **The capsular substance of *Bacillus anthracis*.**—*Biochem. J.* **40.** 297–307. **560**

II. WHITE, P. B. (1946.) *Appendix.* **Note on the selection of non-sporing and mucoid variants from a strain of *B. anthracis* and on the extraction from the mucoid form of the capsular substance.**—*Ibid.* 308–309. **561**

I. The two capsulated strains studied were "Vollum", a highly virulent strain, and "HM", a non-sporing variant of low virulence obtained by growing "Vollum" with a special serum. No evidence for any chemical differences between the capsular substance of the two strains could be found. The capsular material was made up from D(−) glutamic acid residues only, of molecular weight >50,000, comparing in size with the molecular weights of many proteins.

II. This note describes the techniques for selecting non-sporing and mucoid variants, from the "Vollum" strain of *Bacillus anthracis*, by incubating the organism with varying concentrations of anti-anthrax serum, saline and fresh g. pig serum (complement), which was diluted with nutrient broth in three different dilutions. The mixtures were plated out on nutrient agar after 12 or 18 hours' incubation at 37°C. Amongst the well recognized types of colony, a number of circular, raised, opaque, moistly caseous and yellowish asporogenous colonies also appeared. These were maintained. Two samples of anti-anthrax serum were available, one from Budapest and one from Sienna. In colonies of cultures treated with the sample of serum from Budapest, colonies of mucoid appearance and consistency were formed by capsulated bacilli. A method is given for the extraction of the capsular material which, on injection into rabbits, did not give rise to antibodies.—MALCOLM WOODBINE.

SALVI, A. E. K. (1949.) **Para-amino-salicylic acid as an aerosol in the treatment of respiratory tuberculosis.**—*Tubercle, Lond.* **30.** 223–226. [Author's summary copied *verbatim.*] **562**

A small series of cases is described in which combined treatment with P.A.S. by mouth and as an aerosol has produced promising results. Local application to accessible tuberculous ulceration has also induced healing where the condition was not terminal.

MITCHISON, D. A. (1949.) **Tests for strepto-**

mycin sensitivity of tubercle bacilli in tween 80 albumin liquid medium.—*Lancet.* **257.** 694–696. [Abst. from author's summary copied *verbatim.*] **563**

205 strains of *Myco. tuberculosis* obtained before treatment with streptomycin were found equally sensitive to streptomycin when tested in Tween 80 albumin liquid medium. 398 strains showing resistance to streptomycin fell into three groups, each showing a characteristic level of sensitivity. The increased resistance of strains belonging to one of the groups, which are on the average only four times less sensitive than the standard sensitive strain, may not be observed unless two or more strains are tested from any one patient. The length of time during which the primary culture is incubated does not affect the result of the sensitivity test.

CATHIE, I. A. B. (1949.) **Streptomycin-streptokinase treatment of tuberculous meningitis.**—*Lancet.* **256.** 441–442. **564**

Histological sections from brains of cases of tuberculous meningitis obtained P.M. after unsuccessful streptomycin treatment indicate that a fibrinous exudate containing drug sensitive *Mycobact. tuberculosis* is present. Of 14 streptomycin treated cases, three recovered (21%) and 11 died (79%). Of 19 cases treated with streptomycin and streptokinase 11 recovered (58%) and eight died (42%). The combination involves six weeks of intrathecal treatment.—MALCOLM WOODBINE.

SOLOTOROVSKY, M., SIEGEL, H., BUGIE, E. J., & GREGORY, F. J. (1949.) **The evaluation of antituberculous agents with avian tuberculosis in chicks; a comparison of dihydrostreptomycin and streptomycin.**—*Amer. Rev. Tuberc.* **60.** 366–376. [English & Spanish summaries, English summary copied *verbatim.*] **565**

A new *in vivo* test for assessment of antituberculous activity is described which employs intravenous inoculation of chicks with avian type of *M. tuberculosis.* This test gives highly reproducible results. The effect of treatment is evaluated on the basis of growth curves, mortality data, and histopathologic changes in the liver. The last includes the number of tubercles, the amount of tissue displaced or replaced by the tubercles, the age of the tubercles, and the degree of lymphocytic and granulocytic reaction. The method is applicable to substances showing comparable *in vitro* activity against human and avian types. This test, applied to a comparison of the efficacy of dihydrostreptomycin and streptomycin, indicates that these drugs are of comparable efficacy against avian tuberculosis in the chick.

SMITH, M. I., JACKSON, E. L., JUNGE, J. M., & BHATTACHARYA, B. K. (1949.) **The pharmacologic and chemotherapeutic action of some new sulfones and streptomycin in experimental tuberculosis.**—*Amer. Rev. Tuberc.* **60.** 62–77. [English & Spanish summaries, English summary copied *verbatim.*] **566**

A comparative study is presented of the pharmacologic and chemotherapeutic properties of (1) 4,4′-diaminodiphenylsulfone (DDS), (2) Promin, (3) Sulphetrone and (4) 4-amino-4′-β-hydroxyethylaminodiphenysulfone (hydroxyethyl).

The intravenous toxicity of Promin and Sulphetrone in rats is almost identical if computed on the basis of DDS equivalent. The oral toxicity of Sulphetrone and hydroxyethyl is much less than that of Promin. The low toxicity of Sulphetrone appears to be due to poor absorbability. The blood levels following oral administration of hydroxyethyl are relatively low. This is not due to poor absorbability but rather to a preferential localization of the compound in certain organs and tissues of the body, *e.g.* liver, kidney, lungs, and spleen. About 50 per cent of the dose administered is excreted in the urine in 24 hours, and an undetermined but appreciable amount, possibly 25 per cent, is eliminated in the bile. There is evidence to indicate that Promin and Sulphetrone are metabolized in the body to the parent substance DDS; there is evidence that hydroxyethyl is not metabolized to DDS. Hydroxyethyl has a good chemotherapeutic activity in experimental pneumococcus infection in mice. Its activity in experimental tuberculosis in guinea pigs compares favourably with Promin. Like Promin it potentiates the action of streptomycin. Sulphetrone has a lower activity when used alone and, when used with 5 mg. per Kg. per day of streptomycin, the effect was additive. When used with the large dose of 25 mg. per Kg. per day of streptomycin, some potentiation of action was obtained.

WAKSMAN, S. A., HUTCHISON, D., & KATZ, E. (1949.) **Neomycin activity upon mycobacterium tuberculosis and other mycobacteria.**—*Amer. Rev. Tuberc.* **60.** 78–89. [English & Spanish summaries, English summary copied *verbatim.*] **567**

The results of a comparative study of the antimycobacterial properties of a new antibiotic, neomycin, and certain other antibiotics, including streptomycin, are presented. These results permit the following conclusions: Neomycin is more active than other antibiotics against both pathogenic and saprophytic mycobacteria. Neomycin is just as active against the streptomycin-sensitive as against the streptomycin-resistant mycobacteria. Neomycin does not allow a rapid development of resistance among the mycobacteria as does streptomycin. Repeated transfers of the organism to media containing neomycin brought about only

a slight increase in resistance. The amount of neomycin required to inhibit the growth of mycobacteria depends upon nature of organism, size of inoculum, and length of incubation period. The saprophytic *Mycobacterium* 607 is inhibited by about 0·1 unit per ml. and the pathogenic *M. tuberculosis* by 0·2 to 1·0 unit per ml. Results of the *in vivo* studies against tuberculosis in experimental animals are still insufficient to justify broad conclusions. Neomycin is highly effective against the ordinary pathogenic gram-negative and gram-positive bacteria, the activity dose being one-twentieth to one-fiftieth that of the toxic dose. This is true for both streptomycin-sensitive and streptomycin-resistant organisms. The evidence further suggests that neomycin is also more active against those bacteria than is streptomycin.

FRIEDMAN, E., & SILVERMAN, I. (1949.) **The effect of antihistamine medication on the tuberculin reaction in children.**—*Amer. Rev. Tuberc.* **60.** 354–358. [English & Spanish summaries, English summary copied *verbatim.*] **568**

Pyribenzamine in an oral dose of 60 mg. daily for four days had no inhibiting effect on the tuberculin reaction of 43 children ranging in age from five to eleven years. Pyribenzamine in an oral dose of 240 mg. daily for four days had no effect on the tuberculin reaction of 10 children. In routine tuberculin testing one need not be concerned as to whether the patient is receiving Pyribenzamine, or any antihistamine medications, during the same period. It is believed that the observations presented are in agreement with the belief that a basic difference exists between tuberculo-allergy and tuberculo-anaphylaxis.

POPE, H. (1949.) **Growth inhibition of tubercle bacilli by analogues of phenylalanine.**—*J. Bact.* **58.** 223–228. [Author's summary copied *verbatim.*] **569**

Five analogues of phenylalanine have been tested *in vitro* on the H37Rv strain of tubercle bacillus and the degree of inhibition determined. β-3-Thienylalanine, β-2-thienylalanine, β-2-furyl -alanine, and α-aminophenylmethane sulfonic acid inhibited growth of the organism, but the activity of only the first three compounds was neutralized by phenylalanine.

β-3-Thienylalanine was the most toxic compound tested, 5 mg per cent completely preventing growth in the Proskauer-Beck medium, and 1 mg per cent in the sorbitan monooleate medium.

In addition to phenylalanine, tyrosine, leucine, isoleucine, norleucine, and tryptophan counteracted the toxicity of β-3-thienylalanine although higher concentrations of these amino acids were required.

SMITH, M. I., & EMMART, E. W. (1949.) **Studies in the metabolism of the tubercle bacillus. I. The production of riboflavin.**—*J. Immunol.* **61.** 259–269. **570**

A systematic study of the rate of riboflavin production on Kirchner's medium by *Mycobact. tuberculosis* at different stages of growth. Attempts were made to ascertain the production factors, retarding or accelerating substrates and their effects on growth of the organism. A human strain was grown on 50 ml. quantities of medium in 100 ml. Erlenmeyer flasks at 38°C. and at pH7·2 and riboflavin estimated fluorimetrically. Little or no growth was evident at 8–10 days but, with growth, a progressive increase in fluorescent material occurred. Small additions of Fe, as $FeSO_4$, or 2% sucrose, or both, increased the amount of fluorescent material and stimulated growth. Of three related riboflavin compounds, isoriboflavin had little effect, diaminophenazine inhibited growth and reduced the riboflavin and 4-aminoribityl-xylidine inhibited growth at 50 mg. %, but at 1–20 mg. % was metabolized, in part, to riboflavin.—MALCOLM WOODBINE.

CARPENTER, C. M., STOKINGER, H. E., SUHRLAND, L. G., ACKERMAN, H. (1949.) **Chemotherapy of murine leprosy.**—*Amer. Rev. Tuberc.* **60.** 359–365. [English & Spanish summaries, English summary copied *verbatim.*] **571**

The therapeutic efficacy of Promin, Diasone, and penicillin in early murine leprosy has been compared, employing dosages approximating those used in the treatment of leprosy in man. Streptomycin was evaluated in advanced murine leprosy only. Approximately 50 mg. of Promin, administered daily with the diet, suppressed the infection in rats and increased their longevity compared to that of untreated controls, but failed to effect a cure. Streptomycin, employing daily dosages of 25,000, 50,000, and 100,000 γ per Kg. of body weight, administered subcutaneously every eight hours for five days, had minimal therapeutic effects on advanced murine leprosy. Neither Diasone, 0·5 Gm. per Kg. of body weight, nor aqueous sodium penicillin, 1,000 units injected subcutaneously daily for five months, altered significantly the course of the disease.

SIGURDSSON, B., & TRYGGVADÓTTIR, A. G. (1949.) **Immunization with heat-killed *Mycobacterium paratuberculosis* in mineral oil.**—*J. Bact.* **58.** 271–278. **572**

This is a report on preliminary work on the production of a killed vaccine against Johne's disease. The strains of *M. johnei* direct from a bovine animal were grown on synthetic medium for eight weeks and the whole cultures killed either by steaming at 100°C. for one hour or by holding

at a temperature of 70°C. for one hour; the differences in the temperature used for killing did not appear to influence the results. The product was then dried to a constant weight *in vacuo* and suspended in mineral oil (2 ml.) containing 0·3% phenol. Groups of lambs were vaccinated subcutaneously in the leg with from 5 mg. to 300 mg. of bacilli. The inocula caused nodules of varying size and weight (22–274 g.), which had little tendency to regress over a period of 17–20 months. The internal iliac lymph nodes were found to be enlarged in some instances, but acid fast bacilli could not be demonstrated microscopically in them; the tendency to penetrate was less pronounced with the smaller doses of bacilli. Complement-fixation tests using the tissue antigen of Sigurdsson [see *V. B.* **16.** 181 & **17.** 177] demonstrated antibodies in high titre, which persisted for 20 months in lambs. All vaccinated lambs reacted strongly to avian tuberculin, the sensitivity varying in duration from 2–7 months. Revaccination after 12–15 months gave rise to nodules similar to those of the primary inoculation, but did not appreciably influence the level of complement-fixation antibodies or sensitivity to tuberculin. The immunogenic value of the vaccine is now being investigated.—T. M. Doyle.

Harbour, H. E., & Kershaw, G. F. (1949.) **Erysipelothrix rhusiopathiae infection in sheep. Two outbreaks of post-dipping lameness.**—*Vet. Rec.* **61.** 36–37. **573**

Two to five days after being dipped in a D.D.T.-gammexane dip, sheep became ill and some deaths occurred. *E. rhusiopathiae* was isolated from affected animals. The organism was presumed to have been introduced into the dip by the sheep and to have multiplied in organic matter that had accumulated in it, sheep dipped at a later stage becoming infected [see also Whitten *et al. V. B.* **19.** 321].—Malcolm Woodbine.

Szyfres, B., & Trenchi, H. (1948.) Enfermedad de las barbillas. **[Wattle disease, pasteurella infection, in fowls.]**—*Bol. mens. Direcc. Ganad. Urug.* **30.** 9–25. **574**

In a flock of fowls in Uruguay a number of cases of swelling and abscess formation in the wattles occurred. The disease was chronic in nature and mortality very low.

A *Pasteurella* was isolated in culture and the disease was reproduced by injection of this organism into the wattles of healthy birds. The clinical features and the pathology of the lesions are described.—M. C.

Hillier, J., Mudd, S., & Smith, A. G. (1949.) **Internal structure and nuclei in cells of *Escherichia coli* as shown by improved electron microscopic techniques.**—*J. Bact.* **57.** 319–338. [Authors' summary and conclusions copied *verbatim*.] **575**

The technique of growing bacteria on a thin film of collodion overlying nutrient agar (Hillier, Knaysi, and Baker, 1948) makes it possible to take electron micrographs of micro-colonies that have not been subjected to mechanical disturbance or to the alterations caused by suspending the cells in distilled water.

A newly developed double objective lens with aperture, by greatly increasing contrast, has revealed internal structure in cells of *Escherichia coli* to a degree of fineness that had been predicted but not hitherto achieved. In cells of *E. coli* thus examined, the nucleus appears as a complex pattern of irregularly shaped light areas between the darker areas at the poles and along the potential lines of division of the bacterial cells. These patterns correspond to patterns seen in less detail in young cells fixed with osmic acid vapor and to the "chromatinic bodies" in specimens prepared by Robinow's osmic-acid-HCl-Giemsa technique and by other cytological methods. The nucleus already revealed by various workers by chromatin staining, the Feulgen reaction, and ultraviolet photomicrography is therefore shown in unfixed and unstained cells by electron micrography. The nucleus appears in somewhat finer detail in the electron micrographs than in photomicrographs. Nevertheless, present limits of resolution do not permit assignment of definite structural details to the nucleus. Fine structure on a macromolecular scale can be discerned within the bacterial protoplasm in electron micrographs under most favorable conditions. This structure is interpreted as a delicate three-dimensional latticework in which the trabeculae are aggregates of particles of the order of size of protein molecules. The cell wall of intact cells of *E. coli* shows no evidence of internal structure. However, in the ghosts of phage-lysed cells and in the debris of phage lysis the cell wall can be seen to have been subdivided into elliptical and circular segments; whether these segments pre-exist in the normal cell wall or are newly formed during phage lysis is not known.

Electron micrography of *E. coli* cells under improved conditions therefore reveals the nucleus and new evidences of organization and pattern in the bacterial cell.

Payne, A. M. M. (1949.) **The influence of humidity on the survival of *Bacterium coli* on the skin.**—*Mon. Bull. Min. Hlth publ. Hlth Lab. Serv.* **8.** 263–271. [Author's summary slightly modified.] **576**

The survival time of *Bact. coli* on the hands and on filter paper was shortest at 46 per cent. humidity. At higher humidities it was consider-

ably prolonged. At lower humidities there was a slight increase. On filter paper, imbibition of water by the fibres of the paper appears to act in the same way as evaporation and causes the death of the organisms by removing water from their environment. No similar effect was found on the hands. The concentration of electrolytes does not account for the rapid death rate in the early stages of drying. It is concluded that the death rate of *Bact. coli* both on the skin and on filter paper depends on the rate of drying, being maximal at humidities between 40 and 50 per cent. The lethal mechanism cannot yet be precisely defined.

SELLERS, K. C., & EDEN, E. (1949.) **The effect of " white scour " on the absorption of vitamin A by calves.**—*J. comp. Path.* **59.** 205–212. [Authors' summary copied *verbatim.*] **577**

Single or repeated doses of vitamin A were given by mouth to scouring and control calves. Vitamin A levels of plasma were determined before and after dosing. Vitamin A determinations were also made on the faeces and on the liver.

Four hours after dosing, the vitamin A level of the blood of all the control animals had risen by 300 to 500 per cent. The rise was much smaller in scouring animals and in some of them it did not occur at all. In the control animals only traces of vitamin A were found in the faeces, whereas in the scouring animals definite evidence was obtained that vitamin A was lost in the faeces. In the scouring animals the liver reserves of vitamin A were only about one third of those in the control animals

ESKEY, C. R., PRINCE, F. M., & FULLER, F. B. (1949.) **Transmission of *Salmonella enteritidis* by the rat fleas *Xenopsylla cheopis* and *Nosopsyllus fasciatus*.**—*Publ. Hlth Rep., Wash.* **64.** 933–941. [Authors' summary copied *verbatim.*] **578**

The investigation demonstrates that the two common rat fleas, *Xenopsylla cheopis* and *Nosopsyllus fasciatus* may be infected with *Salmonella enteritidis* when feeding on infected mice and that the fleas may transmit the infection from one mouse to another by their bites. Furthermore, the feces of infected fleas also contain viable organisms in large numbers and provide an additional means by which the infection may be disseminated. Many fleas become free of the infection, but over half of them remain infected until death. *S. enteritidis* infection appears to produce certain pathological conditions in the alimentary canal of fleas that tend to shorten the lives of many of them. However, some fleas survived the infection for more than 2 months. The mechanism by which the flea infects its host by its bite is unknown, but probably results from the regurgitation of infectious material from the esophagus.

FINLAYSON, M. (1949.) **An outbreak of *Salmonella typhi murium* in Alberta.**—*Canad. J. publ. Hlth.* **40.** 396–397. [Author's summary copied *verbatim.*] **579**

An outbreak of *S. typhi-murium* affecting a family of seven residing on a farm is reported. An organism, apparently identical with the strain isolated from members of this family, was isolated from a calf on this farm.

SZAFLARSKI, J. (1948.) Zatrucie pokarmowe ludzi po spożyciu wieprzowiny w Gołonogu. **[A case of food-poisoning in man, caused by pork.]**—*Med. weteryn.* **4.** 37–38. [English summary.] **580**

A note on *Salmonella typhi-murium* infection in two persons.

MORALES-OTERO, P., & GONZÁLEZ, L. M. (1949.) **A readily soluble form of P.B.P. [purified brucella protein] for use as a routine diagnostic test.**—*Proc. Soc. exp. Biol. N.Y.* **71.** 387–388. [Authors' summary copied *verbatim.*] **581**

A purified brucella protein, subjected to further purification and presented in a soluble lyophilized form, has been described. Weighed amounts are placed in glass vials, which, after the addition of a measured quantity of sterile saline buffered solution, produces a product ready for use. This procedure facilitates the use of the product in epidemiological investigation and as a routine diagnostic test.

BRAUN, W. (1949.) **Studies on bacterial variation and selective environments. I. The nature of the selective serum factor affecting the variation of *Brucella abortus*. II. The effects of sera from brucella-infected animals and from normal animals of different species upon the variation of *Brucella abortus*.**—*J. Bact.* **58.** 291–297; & 299–305. [Author's summaries copied *verbatim.*] **582**

I. A previously demonstrated heat-stable, filtrable factor that selectively suppressed the establishment of nonsmooth *Brucella abortus* variants in buffered broth cultures of smooth types, to which normal serum or plasma had been added, was found to be associated with the γ- and certain β-globulin fractions of normal bovine plasma. The factor has also been observed in a γ-globulin fraction of human plasma, but, in contrast to the bovine fractions, the human γ-globulin fraction used in these studies simultaneously exhibited a strong antibacterial effect upon virulent and avirulent strains of *Brucella abortus*.

II. The previously described selective activity of normal sera from *Brucella*-susceptible

species suppressing the establishment of non-smooth *Brucella abortus* types in smooth broth cultures was found to be lacking in sera from infected animals of these susceptible species, and was also found to be absent in sera from normal animals of nonsusceptible species. The change in activity of sera from infected animals belonging to susceptible species occurred approximately 4 weeks after agglutinins were first detected and persisted for at least 2 years after their disappearance.

Different effects were produced by sera from infected or vaccinated animals upon the variation of a virulent culture or a strain with low virulence (strain 19), respectively. This suggests that the effect of an animal's serum upon *in vitro* variation may be utilized for diagnostic tests, indicating the status of an animal in regard to *Brucella* infection or past vaccination independently of agglutination titers. The possibility of a causal relationship between serum selectivity and susceptibility has been discussed.

JONES, W. G., POLLARD, A. L., & HOLTMAN, D. F. (1949.) **Variations in normal and *Brucella*-immune rabbit serum as determined by paper-partition chromatography.**—*J. Bact.* **58.** 307–311. [Authors' summary copied *verbatim.*] **583**

Paper-partition chromatography was employed for the determination of the amino acid content of normal rabbit serum and *Brucella*-immune rabbit serum. The normal rabbits were bled prior to immunization with *Brucella abortus* and again after the agglutinin titer reached 1 : 1,280. Both normal and immune sera were hydrolyzed with 12 N hydrochloric acid, and 0·02 ml of the hydrolyzate were placed on paper strips for chromatographic analysis. Two different solvent systems were employed—(1) distilled phenol and (2) collidine and lutidine. The amino acids of normal serum were identifiable in the *Brucella*-immune serum, but the latter also showed the presence of two additional amino acids or compounds containing groups specific for the ninhydrin developer when the collidine-lutidine solvent was used.

With the Millon test it was shown that the phenolic group was present in the immune serum and absent in the normal serum. When the sodium diethyldithiocarbonate reagent was used to test elutions of given portions of the paper strips, copper or iron was indicated in some of the areas and absent in others. The color band with an Rf value of 0·81 was absent after adsorption of the immune serum with *Brucella abortus.*

HALL, W. H., & SPINK, W. W. (1947.) ***In vitro* sensitivity of *Brucella* to streptomycin : development of resistance during streptomycin treatment.**—*Proc. Soc. exp. Biol., N.Y.* **64.** 403–406. **584**

Twenty-six cultures of *Br. abortus*, 13 of *Br. suis* and one of *Br. melitensis* were tested *in vitro* for sensitivity to streptomycin and growth was found to be completely inhibited by concentrations not greater than 4 μg. per ml. One rough strain of *Br. abortus* was not sensitive and required 100 μg. per ml. streptomycin to inhibit growth. Sensitivity was tested by growing the organisms in serial dilutions of streptomycin in broth for 24 hours at 37°C. in 10% CO_2 and subculturing on tryptose phosphate agar plates and examining the colonies after 96 hours' incubation at 37°C. in 10% CO_2.

In one patient with acute brucellosis resistance of the organisms to streptomycin developed during treatment. Before treatment *Br. abortus* was isolated and the strain found to be sensitive to 1 μg. per ml. of streptomycin. The patient received 118 g. streptomycin intramuscularly over 31 days. On the 29th day of treatment the strain of brucella isolated from the blood grew in the presence of 7,500 μg. per ml. streptomycin, but was inhibited by 10,000 μg. per ml.—J. I. TAYLOR.

SCHUHARDT, V. T., RODE, L. J., FOSTER, J. W., & OGLESBY, G. (1949.) **An antibrucella factor in peptones.**—*J. Bact.* **57.** 1–8. [Authors' summary copied *verbatim.*] **585**

An antibrucella factor has been found in certain lots of Difco tryptose that proved to be uniformly brucellacidal to relatively large inocula of each of 13 cultures of *Brucella abortus* tested. *Brucella suis* and *Brucella melitensis* cultures exhibited varying degrees of susceptibility to the toxic tryptose factor. A similar, if not identical, factor has been found in most samples of Difco peptone tested. The antibrucella factor can be adsorbed from aqueous solutions of the peptones by " norit." It can also be extracted from the dry peptones or eluted from norit by pyridine. Ethyl ether will precipitate the factor from pyridine. A 60-fold concentration of the factor has been accomplished by these methods.

The antibrucella factor appears to be an amphoteric compound either present in the peptones in large amounts or present in association with neutralizing substances that accompany the toxic factor through the purification process. Oxidized polypeptides or amino acids are suspected as the toxic agents.

CRUICKSHANK, J. C. (1949.) **The treatment of experimental infection with *Brucella abortus* in guinea-pigs, including a trial of aureomycin.**—*Mon. Bull. Min. Hlth publ. Hlth Lab. Serv.* **8.** 190–202. [Author's summary copied *verbatim.*] **586**

The formation of agglutinins in groups of guinea-pigs inoculated intramuscularly with different doses of *Br. abortus* has been studied. No material fluctuation in the average titre of serum complement was observed throughout the disease. In groups of guinea-pigs receiving a course of sulphadiazine from the 10th to 20th day the formation of agglutinins was greatly inhibited, lesions were less severe and splenic cultures were sometimes negative in animals killed during the fifth to seventh week. Injections of normal guinea-pig blood did not influence the course of infection and did not enhance the effect of sulphadiazine treatment. As judged by the formation of antibodies and the severity of the lesions, the course of infection was favourably influenced by a 10-day course of aureomycin begun on the third, seventh or tenth day. Bacteriological sterility was not achieved.

The curve of agglutinin formation in animals treated with sulphadiazine and with aureomycin differs greatly from that of untreated animals, and estimation of titres in blood obtained by heart puncture may prove useful in estimating whether an agent is worthy of clinical trial. With both drugs, in the dosages employed, the failure to sterilize the tissues was reflected in a striking rise in the agglutinin titres of surviving animals after the sixth or seventh week of infection. It is emphasized that final assessment of any treatment can only be made by clinical trial in human infections.

McDaniels, H. E. (1948.) **Tularemia in Illinois.**—*Ill. med. J.* **92.** 224–228. **587**

A general review of the disease followed by a description of its incidence in Illinois in the period 1926–45. The cotton-tail is the main source of infection for man, but many other animals are susceptible and a list is given of the species from which the organism has been isolated. Diagnosis and control of the disease in man are described.—M. C.

Friedemann, U., & Traub, F. B. (1949.) **Pathogenesis of tetanus. IV. Pathogenesis of local tetanus in the dog and the cat.**—*J. Immunol.* **63.** 23–28. [Authors' conclusions copied *verbatim.*] **588**

In the cat and the dog, local tetanus is of central origin. This follows from the fact that to prevent the appearance of local tetanus 20 times less antitoxin is needed by the intracisternal than by the intravenous route.

These experiments provide additional evidence for the nerve carriage theory of Meyer and Ransom.

Geurden, L., Thoonen, J., & Galmart, J. (1942.) Over enkele gevallen van botulisme bij paarden. [**Certain cases of *Clostridium botulinum* intoxication in horses.**]—*Vlaam. Diergeneesk. Tijdschr.* **11.** 157–169. [English, French & German summaries.] **589**

The authors record the history, illness and P.M. findings observed in six horses, aged 3–10 years and a foal three months old. Clinical symptoms, varying from animal to animal, were: paraplegia, paresis of neck muscles and hind limbs, slight icterus of visible mucous membranes, absence of reflexes, slight diarrhoea, impaired gait, anaesthesia of skin, slight mydriasis, and normal temperature. Four animals were examined P.M., but there were no characteristic findings. Lesions noted were diffuse gastritis, subendocardial haemorrhages, fatty degeneration of the liver, punctiform haemorrhages in the stomach and small intestine, slight congestion of the meninges and venous stasis in the lungs. Chemical analyses of forage, water and organs yielded negative results, but feeding of samples of the oats produced paresis and death in a g. pig and in one of two mice; wheat straw produced paralysis and death in mice and g. pigs; clover and grass proved toxic to a g. pig. *Clostridium botulinum* Type D was isolated from one mouse and from the liver, spleen, kidneys and stomach contents of one horse; hitherto this type had been recovered only from cattle. The forage proved non-toxic to cattle and to rabbits. It is believed that the death of the foal resulted from excretion of the toxin in the dam's milk. The authors suspected that heat generated by a fire in a nearby shed caused multiplication of the bacteria and toxin formation in the forage which had been stored while still damp. One horse which had eaten some of the affected forage remained healthy.—P. L. le Roux.

Ainsworth, G. C., & Rewell, R. E. (1949.) **The incidence of aspergillosis in captive wild birds.**—*J. comp. Path.* **59.** 213–224. [Authors' summary copied *verbatim.*] **590**

Seventy-eight cases diagnosed as aspergillosis in captive wild birds were examined in detail. The gross morbid features are tabulated. The histological features are described and discussed. Previous accounts have stressed a granulomatous type of lesion, but a more widespread one without specific histological features appears more common. Lesions occur almost always in the respiratory system. Cultures were made from 68 cases; 45 yielded pure growths of *Aspergillus fumigatus*, three were *A. flavus*, one was *A. nidulans*. There were no anatomical differences in the disease produced by these fungi.

The disease is essentially one of recently-captured water birds, *e.g.* penguins, although sporadic cases do occur in birds of all types and after long periods in captivity. It is possible that

it exists in the wild state far from contact with other animals. The epidemiology is discussed briefly.

LEONARD, J. M., & BLACKFORD, V. L. (1949.) **Fungus-inhibitive properties of bromoacetamides.**—*J. Bact.* **57.** 339–347. [Authors' summary copied *verbatim*.] **591**

A group of new compounds, 26 N-alkyl α-bromoacetamides and 10 N-aryl α-haloamides have been assayed as fungus inhibitors. The method depends upon determinations of the radial growth rates of the test organisms upon nutrient agars containing definite concentrations of the toxicant.

A high order of toxicity is indicated for certain bromoacetamides, notably the N-phenyl and the N-alkyls in which the substituent contains four to ten carbon atoms. The mono-N-substituted compounds are more active than the di-substituted; the primary alkyls are more active than the secondary; and the normal chains are more potent than the branched ones.

Among the aromatic compounds, none exceeded the simple N-phenyl derivative, bromoacetanilide, in activity. On the basis of limited observations it is predicted that the chlorine analogs of these compounds are much less active, and that polyhalogenation of the carbon will not augment the fungistatic powers. The dosage response data indicate that the action of these toxic compounds is not attributable simply to the activation of bromine or to any other single mechanism.

MCINTYRE, W. I. M., & STUART, R. D. (1949.) **Canine leptospirosis.**—*Vet. Rec.* **61.** 411–418. **592**

A significant association between renal disease and infection by *L. canicola* was demonstrated in a series of 416 dogs by serological, cultural and microscopic methods. Blood urea examination proved of value in assessing the degree of kidney trauma and hence the prognosis. A useful classification into three clinical stages was suggested but these are not always distinct or successive.

In the invasive and primary renal stages penicillin therapy was found apparently to eliminate the organism in a few days, but recovery depended on the extent of tissue injury. If the kidney was at all seriously damaged the last stage, secondary renal involvement, might end in a fatal uraemia months or years after the initial attack.

In the course of the investigation 21 cases of *L. icterohaemorrhagiae* infection were detected. In such cases there was less kidney dysfunction, probably because fewer animals with severe damage recover from this infection. Penicillin failed to save the lives of all those with jaundice.

Once damaged the kidney tissue is never regenerated. Difficulty of diagnosis in the early stages may result in delay in penicillin treatment. For this reason the desirability of an effective vaccine against *L. canicola* is stressed.

—K. G. TOWERS.

HEUSSER, H. (1948.) Die periodische Augenentzündung, eine Leptospirose? **[Leptospira infection and periodic ophthalmia of horses.]**—*Schweiz. Arch. Tierheilk.* **90.** 287–312. **593**

Agglutination tests for leptospirosis in 291 horses affected with periodic ophthalmia, and 263 healthy horses, gave mainly positive results in the animals with that disease and mainly negative in the healthy. Leptospira have not yet been recovered from the affected eyes, the blood or the organs, nor has the disease been transmitted; H., however, speculates whether they are the cause of the disease.

Altogether nine types of leptospira were used in the tests, but positive reactions were obtained with only three, *Leptospira grippotyphosa*, *L. australis* and *L. pomona* (apart from one reaction to *L. sejroe*). The agglutinin titres ranged up to 1 : 400 in healthy horses and varied between 1 : 400 and 1 : 25,000 in horses with periodic ophthalmia. Aqueous humour was tested in 15 cases. Shortly after the first appearance of the condition in three horses the titres of the aqueous humour were much higher than the blood titres; in eight cases known to have been affected by the disease for some time the aqueous humour titres were much lower than the blood titres. The aqueous humour of four healthy horses gave negative results.

The geographical distribution of the disease in Switzerland indicates that the great majority of affected horses with *L. pomona* antibodies in their serum are found in the eastern part of the country where pigs, the natural reservoirs, are known to carry *L. pomona*.—I. W. JENNINGS.

VAN SACEGHEM, R. (1947.) La bartonellose des bovidés au Ruanda. **[Bartonellosis in cattle in Ruanda (Belgian Congo).]**—*Bull. Soc. Path. exot.* **40.** 334–339. **594**

Two heifers of local indigenous breed had symptoms suggestive of trypanosomiasis, but no trypanosomes could be found on examination of the blood. In stained blood films organisms which were considered to be *Bartonella* were seen attached to many of the red corpuscles which were enlarged and stained poorly. The Weil-Felix reaction was negative. Blood from one of the heifers was injected subcutaneously into one g. pig and into the peritoneal cavity of another. Neither of these g. pigs had any reaction.

One of the heifers was treated with atoxyl, 2 g. injected subcutaneously on three occasions at five-day intervals, and improved rapidly. The other, untreated heifer, had symptoms for a long period. The symptoms are wasting, constipation and intense thirst. It is stated that the African cattle owners recognize the condition and differentiate it from trypanosomiasis.—M. C.

INGRAM, M. (1947.) **A theory relating the action of salts on bacterial respiration to their influence on the solubility of proteins.**—*Proc. roy. Soc.* Ser. B. **134.** 181–201. [Author's summary copied *verbatim.*] **595**

Evidence has been presented indicating that the action of concentrated solutions of salts on bacterial respiration may be partly explained in terms of salting-out. It has been suggested that the material upon which this action is exerted is probably one of the proteins concerned in respiration, perhaps a dehydrogenating enzyme.

This theory provides satisfactory explanations for: (a) the relation between salt concentration and rate of respiration or dehydrogenase activity; (b) the effect of temperature on this relation; and (c) the effect of pH on this relation, if it is further supposed that only the zwitterionic fraction of the protein is involved.

The relative actions of various salts are in fair agreement with this suggestion, but provide no very convincing evidence either for or against it.

The chief point of difficulty lies in the range of concentration over which the action is manifest. With halophilic bacteria, the evidence is consonant with the above view if the protein involved is one of high molecular weight. With normal organisms the salt concentrations are much lower than those causing salting-out.

There is a little evidence that in normal organisms the dehydrogenating enzymes are less sensitive to salts than the intact cells, which may be the source of the discrepancy. No reason for this can yet be suggested, but the property must be absent from the enzymes of halophilic organisms, and whatever it is, its absence must be the foundation of the halophilic character.

See also absts. **687–688** (intestinal and ruminal flora); **725** (inhibition of bacterial growth); **726** (surface-active agents); **730, 732, 733** and **767** (penicillin); **738** (bactericide); **769** (enterococci); **784** (bacteria and fertility); **785** (in fowl semen); **809** (heated bacteria under electron microscope); **810** (in faeces); **813** (Canada, Report); **814–815** (Gold Coast, Reports); **816–817** (Mauritius, Reports); **820** (textbook); **821** (book, *Penicillium*); **822** (book, streptomycin).

DISEASES CAUSED BY PROTOZOAN PARASITES

JAMES, D. M. (1949.) **The relationship between the effect of certain therapeutic agents on infusoria and on pathogenic protozoa.**—*Ann. trop. Med. Parasit.* **43.** 164–178. [Author's summary copied *verbatim.*] **596**

The minimum lethal concentrations of several antiprotozoal drugs were determined for two species of infusoria, *Paramoecium caudatum* and *Colpidium colpoda*, and their lethality was found to be roughly parallel for the two organisms. The relative activities of the drugs to infusoria and to pathogenic organisms were determined, and the following conclusions were reached: (a) The arsenicals show an activity against infusoria which is exactly parallel to that on trypanosomes *in vivo*. The *in vitro* results are also comparable with those on infusoria. (b) The amoebicides show exactly the same order of activity against the infusoria as they do against dysenteric amoebae, both *in vitro* and *in vivo*. (c) There is a relationship between the activity of the diamidines on infusoria and on *Leishmania in vitro*. (d) There is no relationship between the activity of the antimalarials against infusoria and against *Plasmodium*. (e) There is slight evidence that the order of activity of the antimonials may be the same against infusoria as against *Leishmania donovani* infections in hamsters.

It is doubtful, therefore, whether this method will be of value in the routine testing of antiprotozoal drugs in general, but it is possible that it might afford some assistance in screening new compounds suggested for certain protozoal infections.

ZARNOWSKI, E. (1949.) Badania nad przenoszeniem zarazy stadniczej koni przez owady kłujace. **[Studies on the transmission of dourine by insects.]**—*Med. weteryn.* **5.** 178–181. [English summary.] **597**

Unsuccessful attempts to transmit *Trypanosoma equiperdum* infection by insects are described. The insects used were *Ctenocephalides canis*, *Ceratophyllus fasciatus*, *Linognathus piliferus* and *Stomoxys calcitrans*. Z. is of the opinion that transmission by insects under natural conditions is unlikely.—E. G.

STEWART, J. L. (1947.) **Porcine trypanosomiasis.**—*Vet. Rec.* **59.** 648. **598**

The pathogenicity of *T. brucei*, *T. vivax* and *T. congolense* for pigs was studied using both pure-bred Large Whites and Large Blacks and some crosses between these and the indigenous pig. Infection was by inoculation of blood in most cases, but a few pigs were infected by permitting infected tsetse flies to bite them.

Infection with all three species was readily established as demonstrated by examination of the blood for trypanosomes. The incubation periods

were for *T. vivax* from 4–15 days, *T. congolense* 7–56 days and *T. brucei* 7–32 days. None of these three species, however, appear to cause clinical symptoms in pigs.

These experiments corroborate field experience in the Gold Coast that only *T. simiae* is seriously pathogenic for pigs.—M. C.

TALICE, R. V. (1949.) **The Chagas' disease of Uruguay.**—*Trans. R. Soc. Trop. Med. Hyg.* **43.** 107–109. Discussion: pp. 110–112. **599**

T. exhibited a film illustrating the features of this disease as it occurs in Uruguay. In the discussion Hoare, C. A., enquired whether there were any reservoirs of infection in the wild animals in Uruguay and was informed that the opossum is the most frequently infected wild animal and 30% of puppies in the endemic region are infected. —M. C.

BÜLBRING, E., LOURIE, E. M., & PARDOE, U. (1949.) **The presence of acetylcholine in *Trypanosoma rhodesiense* and its absence from *Plasmodium gallinaceum*.**—*Brit. J. Pharmacol.* **4.** 290–294. [Authors' summary copied *verbatim*.] **600**

Trypanosoma rhodesiense has been found to contain acetylcholine to the extent of 2·28 to 8·23 μg. per 10^{10} trypanosomes, or 2·38 to 8·60 μg. per g. wet weight. The formation of acetylcholine has been demonstrated *in vitro* in amounts up to 5·50 μg. per 10^{10} trypanosomes, or 71·5 μg. per g. acetone-dried powder, in 75 min. at 37°C.

Plasmodium gallinaceum has been found neither to contain nor to synthesize acetylcholine.

SIEGRIST, J. J. (1948.) Zur Erkennung und Bekämpfung des seuchenhaften Frühverwerfens des Rindes. **[Diagnosis and control of contagious (*Trichomonas*) abortion in cattle.]**—*Schweiz. Arch. Tierheilk.* **90.** 29–36. [French summary.] **601**

Addition of penicillin to relatively simple culture media, such as glucose or lactose broth with 10% serum added, helps to overcome the principal difficulty in the cultivation of *Trichomonas foetus*.

It was not possible, in experiments conducted on g. pigs, to prove conclusively whether a previous infection increases resistance against a new infection. Serum of g. pigs treated with pure cultures seemed to stimulate phagocytic action on *Trichomonas foetus*.—W. STECK.

DE VOLT, H. M., & HOLST, A. P. (1949.) **Comparative value of chlorohydroxyquinoline and Vioform as preventives of blackhead (infectious enterohepatitis) of turkeys.**—*Poult. Sci.* **28.** 641–643. [Authors' summary copied *verbatim*.] **602**

Chlorohydroxyquinoline and Vioform lowered significantly the death rate from experimental infectious enterohepatitis in turkeys, when administered in dry mash at the level of one percent. Chlorohydroxyquinoline has compared favorably with Vioform as a preventive of artificially induced infectious enterohepatitis on the basis of observations to date.

RIEDEL, B. B., BELL, J. C., BARBER, C. W., & HAYS, T. A. S. (1949.) **The control of experimental coccidiosis in chickens with a mixture of two quaternary ammonium compounds.**—*Poult. Sci.* **28.** 703–706. [Authors' summary copied *verbatim*.] **603**

The coccidiostatic value of a mixture of quaternary ammonium compounds composed of five percent alkyl - dimethyl - benzyl - ammonium chloride and five percent alkyl-dimethyl-dichlorbenzyl-ammonium chloride was studied. The test was made on a total of 4,085 chicks raised under field and laboratory conditions. Observation of symptoms and mortality indicated that the mixture (Formula 124) administered at the concentrations of 1 : 2,000, 1 : 3,000 and 1 : 4,000 parts in the ration did not protect the chicks when infected with sufficient *Eimeria tenella* oocysts to produce from 18·2 to 90·7 percent mortality in controls.

TODD, A. C., CULTON, T. G., KELLEY, G. W., & HANSEN, M. F. (1949.) **Induced hyperthyroidism and growth of parasitized chicks.**—*Poult. Sci.* **28.** 549–551. **604**

The data relate to *Eimeria* infestation in chicks on a standard growing ration and on the same ration plus thyroprotein in the form of protamone. The growth of the infected birds is also noted.

One hundred birds, each weighing 60–70 g. at one week old, were used. Those receiving protamone were started at 46 days old and four days later each was given 250 oöcysts which were mostly *Eimeria tenella*.

The experiment lasted for 23 days and the slight gain made by uninfected as compared with infected birds was insignificant. Development of *E. tenella* was significantly greater in those birds given thyroprotein, hence greater oöcyst counts may be expected in birds fed diets which induce mild hyperthyroidism.—J. G. O'SULLIVAN.

DICKINSON, E. M. (1949.) **The effect of sulfaquinoxaline on *Eimeria acervulina* infection in pullets in egg production.**—*Poult. Sci.* **28.** 670–674. [Author's summary copied *verbatim*.] **605**

In these trials sulfaquinoxaline gave an effective coccidiostatic action against an artificial infection of *E. acervulina* in laying pullets, when fed 72 hours after coccidial inoculation, in an all-

mash ration for seven days at levels of 0·015, 0·03, and 0·05 percent. The coccidiostatic action did not prevent the development of immunity although it did prevent the formation of oocysts. The body weight and egg production were not noticeably affected in the birds fed sulfaquinoxaline at the levels indicated.

RUSKIN, A., & RIGDON, R. H. (1949.) **The electrocardiogram of normal and malaria-infected monkeys.**—*J. Lab. clin. Med.* **34.** 1105–1108. [Authors' summary and conclusions copied *verbatim*.] **606**

The normal electrocardiogram of the *Macaca mulatta* monkey is between that of the dog and man. The variability includes negativity of the T waves in Leads I, II, and IV F and displacement of the S-T segments from the isoelectric line.

The electrocardiogram of malaria-infected *Macaca mulatta* monkeys does not differ from that of the controls in the great majority of instances. The rare exceptions include marked (left) axis deviation and slight prolongation of the Q-T interval. No typically anoxemic electrocardiographic changes were demonstrated, even in monkeys showing red blood cell counts only 25 per cent of normal.

The absence of significant electrocardiographic alterations in monkeys infected with *P. knowlesi* is consistent with the known pathologic changes in malaria in monkeys and with the findings of others in a large series of cases of malaria in human beings.

JUSSIANT. (1948.) Existence de la piroplasmose du porc au Congo Belge. **[Piroplasmosis in pigs in the Belgian Congo.]**—*Ann. Soc. belge Méd. trop.* **28.** 377–378. **607**

A ten-month-old boar of the Large White breed, purchased for the improvement of the local breed of pigs, developed fever and symptoms of collapse. Large piroplasms, probably *Babesia trautmanni*, were present in the blood. The boar recovered following the intravenous injection of 0·10 g. trypanblue in 10 ml. of water. Ticks were not numerous in the area.—M. C.

NEITZ, W. O. (1946.) **Studies on the aetiology of East Coast fever.**—*J. S. Afr. vet. med. Ass.* **17.** 92–110. **608**

N. discusses the varying results which follow artificial infection of cattle with East Coast fever, the nature of the immunity in this disease and the possibility of symbiosis between protozoa and other organisms.

Since a sterile immunity is not a feature of other protozoan disease but is characteristic of many virus diseases N. postulates that *Theileria* spp. live in symbiosis with a virus.—M. C.

DIESEL, A. M., & VAN DRIMMELEN, G. C. (1948.) **The diagnosis of East Coast fever in South Africa: a review.**—*J. S. Afr. vet. med. Ass.* **19.** 81–92. **609**

In the early years of this century diagnosis was based on the finding of lesions in the kidney and liver. Then for a period of about 20 years the presence of Koch's blue bodies was considered to be diagnostic. The position became complicated when it was found that Koch's bodies could be found during the course of *T. mutans* infection and greater attention was paid to such features as history of the area, movements of stock and presence of the vector, a definite diagnosis being made after correlating the laboratory and the field reports. This method often leads to delay. A study of reports on outbreaks which have occurred since 1920 indicates that non-fatal cases may occur and may remain a source of infection for the vector ticks and in this way the disease may remain obscure on a farm for a period of years. —M. C.

DE RODANICHE, E., & DE PINZON, T. (1949.) **Spontaneous toxoplasmosis in the guinea-pig in Panama.**—*J. Parasit.* **35.** 152–155. **610**

From a batch of g. pigs purchased locally in Panama, and which had no contact with recently imported animals, one died on the day after its arrival. Gross pathological lesions were absent but numerous toxoplasms were demonstrated in Giemsa-stained smears of liver, spleen, lungs and peritoneum. Suspension of spleen and liver was inoculated into two mice, which died in 24 hours. Only one of these was examined P.M. when smears from many organs, including brain, heart and testis, revealed many toxoplasms besides a septicaemia by Gram-positive diplococci.

A further two g. pigs of the batch were killed later, after having been used for work with *Rickettsia burneti*, and P.M. examination revealed light infection with *Toxoplasma*.—J. G. O'S.

BLANC, G., & HINTERMANN, J. (1949.) Un cas de toxoplasmose canine observé au Maroc grande; receptivité du *Xerus getulus* à l'infection expérimentale. **[Canine toxoplasmosis in Morocco; susceptibility of squirrel (*Xerus getulus*) to artificial infection.]**—*Arch. Inst. Pasteur Maroc.* **3.** 618–621. **611**

A Cocker spaniel bitch which was thought to have rabies and then leishmaniasis, was killed and the spleen used to inoculate two squirrels. One, inoculated intraperitoneally, had pleural and peritoneal exudation, enlarged spleen and areas of pulmonary hepatization when examined P.M. Leishmania was not demonstrated, but the spleen was again used to inoculate a third squirrel. In splenic smears from these two squirrels many toxoplasms were seen.

An unsuccessful attempt was made to continue the infection in squirrels. The authors conclude that since toxoplasmosis occurs in dogs in Morocco, cases also, presumably, occur in man. —J. G. O'Sullivan.

Paraense, W. L. (1949.) A ausencia de ação terapeutica da "Paludrine" na toxoplasmose experimental. **[Ineffectiveness of paludrine in toxoplasmosis.]**—*Mem. Inst. Osw. Cruz.* **46.** 639–645. [English summary.] **612**

In a study of canine piroplasmosis a double infection with *Babesia canis* and *Toxoplasma* parasites was found in one of the dogs. The toxoplasms were transmitted to pigeons by inoculation of spleen pulp. The pigeons died of an acute infection with toxoplasms. The strain was maintained in pigeons. The effect of paludrine on the toxoplasms was tested in a number of infected pigeons, but all the birds developed an intense infection and died.—M. C.

See also absts. **814-815** (Gold Coast, Reports); **818** (Zanzibar, Report); **819** (Sudan, Report).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

Priouzeau, M. (1947.) Séquelles de la fièvre aphteuse des bovidés. **[After-effects of foot and mouth disease in cattle.]**—*Rec. Méd. vét.* **123.** 433–452. **613**

The clinical features and P.M. findings in a working ox which had valvular endocarditis almost occluding the pulmonary orifice of the heart are described. The only illness which this six-year-old ox had had prior to the development of the heart symptoms was a severe attack of foot and mouth disease about two years previously. P. is of opinion that the valvular vegetations were a sequel to the F. & M. disease.

Two cases of thrombosis of the anterior vena cava are also described, these also occurred in cattle which had previously had F. & M. disease. Abscess formation in the heart muscle of a cow is described and is considered to have been a sequel to F. & M. disease.

The heart lesions in these cases are illustrated by good photographs.—M. C.

Minett, F. C. (1948.) **Panting in cattle. A sequel to foot-and-mouth disease.**—*J. Amer. vet. med. Ass.* **113.** 545–550. **614**

A condition which is well known in India occurs in cattle as a sequel to F. & M. disease. It is characterized by overgrowth of the hairy coat, anaemia and dyspnoea; the affected cattle are called "panters". Such cattle become greatly distressed during hot weather and milch cows have a marked drop in milk yield. The pathogenesis of the condition is discussed.—M. C.

Roch, M. (1939.) La fièvre aphteuse chez l'homme. Réponse à quelques questions. **[Foot and mouth disease in man.]**—*Bull. méd.* **53.** 723–726. **615**

A general discussion on F. & M. disease. Transmissibility to man is discussed and lesions in man are described.—E. G.

Federer, K. E., & Aramburu, H. G. (1949.) El valor de la saliva bovina como medio diagnóstico serológico de la fiebre aftosa. **[The use of saliva in the serological diagnosis of foot and mouth disease.]**—*Gac. vet., B. Aires.* **11.** 102–110. [English & German summaries, English summary slightly amended.] **616**

Saliva was found to be unsuitable for use in complement-fixation tests for diagnosis of F. & M. disease.

Fogedby, E. F., & Frenkel, H. S. (1947.) La vaccination anti-aphteuse. (Expériences danoises et néerlandaises.) **[Foot and mouth disease vaccines in Denmark and Holland.]**—*Bull. Off. internat. Epiz.* **28.** May. 5–20. **617**

Experience indicates that in a country such as Holland it is necessary to vaccinate annually a large proportion of the cattle population if epizootics are to be prevented. Further work on improvement of the aluminium adsorbate vaccine is necessary especially with the object of reducing the dose.—M. C.

Zlotnik, I. (1949.) **A severe outbreak of rabies in Israel.**—*Veteran.* **1.** 127–129. **618**

By the 1st of April, 1948, rabies reached endemic proportions in Israel with 14 deaths among human beings and considerable losses among cattle. It was ascribed to numerous jackals acting as a reservoir, and to homeless dogs left by Arab refugees. Eradication of jackals presents difficulties owing to opposition from agriculturalists and to infiltration from frontiers. Diagnosis is carried out solely by the Central Veterinary Laboratory and is based on the demonstration of Negri bodies and inoculation test on white mice. In carnivores it is observed that the size and number of Negri bodies increases with the length of illness. Control measures comprise destruction of jackals and stray dogs, licensing and compulsory vaccination of all other dogs.

—G. V. Laugier.

Steele, J. H., & Tierkel, E. S. (1949.) **Rabies problems and control. A nation-wide program.** —*Publ. Hlth Rep., Wash.* **64.** 785–796. **619**

The alarming increase in the incidence of rabies in the U.S.A. during the past 16 years has prompted the formation of a Federal Rabies

Control Advisory Committee. Effective control in the past has been rendered impossible by the lack of uniformity between states. The essential control measures necessary are enumerated. Stress is laid on efficient and rapid laboratory diagnosis. Research to date favours the impression method of brain examination together with inoculation test on white mice in negative cases. Penicillin treatment of contaminated samples is advocated. Vaccination of dogs is considered an essential part of the programme. Mass immunization over a short period has given startling results. Accurate reporting and circulation of weekly reports is of great assistance in applying control measures before disease reaches epizootic proportions. It is urged that State Control programmes be placed under veterinary direction whilst local programmes must include three broad measures, vaccination, licensing, isolation and destruction of strays. Additional desirable measures are enumerated. Full publicity and education of the public is discussed together with organized trapping of foxes. It is concluded that eradication of rabies in the U.S.A. is possible with the unification of control methods.—G. V. Laugier.

Koprowski, H., & Cox, H. R. (1948.) **Occurrence of rabies virus in the blood of developing chick embryos.**—*Proc. Soc. exp. Biol., N.Y.* **68.** 612–615. **620**

The authors discuss the question of whether rabies virus is present in the blood of infected mammals. Using chick embryos inoculated by the yolk-sac route they were able to demonstrate the presence of virus in the blood by intracerebral inoculation into mice. These experiments do not prove or disprove the infectiousness of mammalian blood from rabies infected animals, but do indicate a different mechanism for dissemination of virus in the chick embryo.—M. C.

Habel, K., Bell, J. F., & Wright, J. T. (1949.) **Benzene-inactivated rabies vaccine.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 455–457. **621**

Rabies vaccine was purified and inactivated by exposure to benzene at 56°C. for 12 hours. These vaccines were as potent antigenically as those inactivated by ultra-violet rays, and completely non-viable.—A. Mayr-Harting.

Bell, J. F., Wright, J. T., & Habel, K. (1949.) **Rabies vaccine freed of the factor causing allergic encephalitis.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 457–461. **622**

Calcium acetate in a final concentration of M/10, added to rabies virus vaccine and then removed by washing, causes the disappearance, in the washing process, of the factor responsible for allergic encephalitis in g. pigs. The antigenic potency of the vaccines thus treated is somewhat lowered, but this is probably a result of poorer dispersion of the antigen. There is some indication that the allergic encephalitis in experimental animals and encephalitis in man following rabies vaccination are similar conditions, and that calcium acetate treatment of vaccines may have practical value.—A. Mayr-Harting.

Freund, J., Lipton, M. M., & Pisani, T. M. (1948.) **Immune response to rabies vaccine in water-in-oil emulsion.**—*Proc. Soc. exp. Biol., N.Y.* **68.** 609–610. **623**

Higher antibody titres were obtained in g. pigs injected with inactivated rabies vaccine in water-in-oil emulsion as compared with inactivated rabies vaccine in water alone. Fatal allergic encephalitis occurred in some of the g. pigs injected with vaccine in water-in-oil emulsion to which *Mycobacterium butyricum* had been added. —M. C.

Anon. (1948.) La prophylaxie de la rage en Hongrie et ses résultats. [**Prophylactic inoculation against rabies in Hungary.**]—*Bull. Off. internat. Epiz.* **29.** 150–162. **624**

A short history of control measures in Hungary where the classical methods failed partly because of public apathy and partly because of lack of enforcement. Compulsory vaccination of dogs throughout the country was enforced in 1939. There were no cases of rabies resulting from vaccination. Simultaneously, police measures were adopted, taxation, destruction of strays, etc. By 1942 outbreaks had dropped to a few isolated cases round the frontiers. In 1944 it became impossible to continue these measures, despite which few outbreaks occurred up to 1946 when there were 56 outbreaks. In 1947 the situation became alarming. Vaccination was re-introduced in some areas but results have been less satisfactory owing to lack of adequate police measures. It is concluded that in a country with no natural frontiers vaccination and strict police measures are essential.—G. V. Laugier.

Lahelle, O., & Horsfall, F. L., Jr. (1949.) **Multiplication of influenza virus in dead chick embryos.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 547–551. **625**

Chick embryos killed by chilling to 4°C. or by prolonged storage at room temperature still contain sufficient living cells to enable influenza virus to multiply in them upon incubation at 35°C.

The final titre reached is very high, but prolonged incubation is necessary.—A. M.-H.

Kalter, S. S. (1949.) **The effect of age upon susceptibility to infection with influenza virus.** —*J. Immunol.* **63.** 17–22. [Author's conclusions copied *verbatim*.] **626**

Influenza virus multiplies in mice of different ages to approximately the same final titer. The virus, however, proliferates more rapidly in young mice as compared with older ones. Depending upon the dosage and age of the animal, maximal virus proliferation is obtained in 6 to 48 hours. As the age of the animals increases more virus is required to cause death. The possible reasons for this are discussed.

KALTER, S. S. (1949.) **Host growth and its relation to influenzal virus infection.**—*J. Immunol.* **63.** 29–35. [Author's conclusions copied *verbatim.*] **627**

Variation in rate of growth of mice, whether induced experimentally by controlled protein intake or occurring naturally, did not result in any detectable change in susceptibility to infection by the PR8 strain of influenza virus inoculated intranasally into the mice. The possible significance of these findings is discussed.

SUGG, J. Y. (1949.) **The variation of antigenic pattern and of mouse virulence in an influenza virus culture.**—*J. Bact.* **58.** 399–406. [Author's summary copied *verbatim.*] **628**

A marked antigenic difference was found to exist between a line of the Cam strain of influenza A prime virus that had been through 30 or more mouse passages and the original line of that same strain that had been maintained in chick embryos. The data show that, although antigenic change may occur with mouse adaptation, an influenza virus that is relatively avirulent for mice may be converted into one that is highly virulent for that species without any apparent change in its antigenic pattern.

CASALS, J. (1949.) **Acetone-ether extracted antigens for complement fixation with certain neurotropic viruses.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 339–343. **629**

Reliable, high-titred antigens for the haemolytic complement fixation test were prepared by a simple method of extraction at room temperature with acetone and ethyl ether of infected brain tissue. The method—described in detail—was successful with the viruses of Japanese B, St. Louis, Western equine and Russian Far East encephalitis.—L. M. MARKSON.

SCHAEFFER, M., SILVER, F. F., & PI, C.-C. (1949.) **Studies on the chemotherapy of virus infections. I. General anesthetics and other drugs ineffective against experimental virus infections in mice.**—*J. Immunol.* **63.** 109–115. [Authors' summary copied *verbatim.*] **630**

Groups of mice inoculated with 2 to 4 LD 50 doses of Eastern equine, Western equine, St. Louis encephalitis, poliomyelitis or influenza viruses and treated with maximal non-fatal doses of diethyl ether by inhalation, sodium amytal, paraldehyde, avertin, magnesium sulfate, morphine, Cytochrome C, dithiobiuret or dithiocarbamate, prior to and following inoculation with the viruses, showed no alteration in the courses of the ensuing infections. The theoretical reasons for the use of these compounds in attempts at chemotherapy of virus infections are discussed.

LAWSON, J. H., MANDERSON, W. G., & HURST, E. W. (1949.) **Louping-ill meningo-encephalitis. A further case and a serological survey.**—*Lancet.* **257.** 696–699. [Authors' summary copied *verbatim.*] **631**

A case of louping-ill meningo-encephalitis in an abattoir worker engaged in sheep killing and skinning is reported.

Laboratory diagnosis is important in separating this disease from other forms of virus encephalitis giving rise to similar symptoms. Sera from 38 of the patient's fellow workers were examined for neutralising antibodies against the virus of louping-ill. Such antibodies were definitely present in 3 cases, and possibly present in a further 3. Serological surveys in the field would probably bring to light cases which have hitherto escaped detection, thus providing a truer picture of the incidence in man.

I. OLITSKY, P. K., & YAGER, R. H. (1949.) **Acute disseminated encephalomyelitis produced in albino mice.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 600–601. **632**

II. OLITSKY, P. K., & YAGER, R. H. (1949.) **Experimental disseminated encephalomyelitis in white mice.**—*J. exp. Med.* **90.** 213–224. **633**

I & II. The first paper is a preliminary report of the investigation reported in detail in the second. The earlier work leading up to the experimental production of allergic encephalitis (demyelinating) in other species by suspensions of normal brain tissue together with the so-called adjuvants is reviewed. This has resulted in a serious consideration of the role of allergy in the aetiology of spontaneous demyelinating diseases. It is now known that normal mammalian white matter contains a factor capable of producing demyelinating disease under certain conditions. Other workers have used monkeys, and g. pigs as experimental animals. Using the same technique these authors have been able to produce disseminated encephalomyelitis in the Swiss strain of mice by the injection of normal mouse brain and adjuvant: they suggest that the mouse may be the animal of choice for further study of this pathological condition. [See also review on experimental allergic encephalitis for full bibliography of work done up to date—INNES, J. R. M. (1950.) *Brit. vet. J.* **106.** 93–103.]—J. R. M. I.

GALLAGHER, F. W. (1949.) **Experimental mixed infection of mice with Lansing poliomyelitis and Western equine encephalomyelitis virus.**—*Science.* **110.** 301–302. **634**

Interference between the viruses of Western equine encephalomyelitis and poliomyelitis, reported in monkeys, does not occur in mice. It is assumed that whether a mouse dies with poliomyelitis or encephalitis is a fortuitous circumstance, depending on which virus happened to gain the ascendancy.—W. R. BETT.

GOOR, S. (1948.) **[Cattle plague in the Middle East. A. History spread and distribution.]**—*Refuah vet. Palestine.* **5.** 43. [Abst. from English summary: p. 76.] **635**

Outbreaks of rinderpest in Palestine occurred in 1903, 1913, 1918 and in 1926. The 1926 outbreak was dealt with by passive immunization with serum. Some 8,000 cattle were inoculated with serum on two separate occasions. Since 1926 Palestine has remained free from rinderpest.

—M. C.

LARRAT, R., SULPICE, J., & NIANG, S. (1947.) Emploi du vaccin antipestique formolé aluminé: temps nécessaire pour l'établissement de l'immunité. **[Use of formol aluminium hydroxide rinderpest vaccine: time required for establishment of immunity.]**—*Rev. Élev. Méd. vét. Pays trop.* **1.** 161–163. **636**

Observations in the field had suggested that immunity to rinderpest was developed considerably quicker following the use of formolized adsorbate vaccine than when a simple formolized vaccine was used.

Twenty-seven calves were vaccinated with a formolized adsorbate vaccine and tested for immunity on the third, fifth and sixth days after vaccination. Of 11 calves tested on the fifth day only two developed typical rinderpest and of 14 tested on the sixth day none developed typical rinderpest although three reacted severely. These findings are considered to justify the use of such vaccines in the face of infection in recently infected herds.—M. C.

JACOTOT, H. (1948.) Les animaux inoculés de peste bovine qui font une infection inapparente sont-ils aptes à donner un bon vaccin antiseptique? **[The quality of rinderpest vaccine from animals with inapparent infection.]**—*Rev. Élev. Méd. vét. Pays trop.* **2.** 47–49. **637**

Experiments made with 16 calves indicated that potent formolized vaccine could be obtained from the tissues of calves which had not reacted strongly to experimental infection. Calves which have not had a good thermal reaction may be used for vaccine production provided typical lesions are present on P.M. examinations. Vaccine made from such animals should be tested for potency before use.—M. C.

GALLO, P., & CALDERÓN, T. R. (1948.) El virus de la neumoenteritis de los terneros. Propiedades físicas, patogenia y cultivo. **[A virus associated with pneumoenteritis in calves.]**—*Bol. Inst. Invest. vet., Caracas.* **3.** 528–537. [English summary.] **638**

The characteristics of a filtrable virus, different from the one described by HORSFALL & CURNEN [*V. B.* **16.** 301 & 349] and NIGG & EATON [*V. B.* **15.** 78] are described. It was isolated from the lungs of calves infected with enteritis and pneumonia. It was destroyed by heating for 10 min. at 60°C. Lung material dried *in vacuo* and stored at 4°C. retained its pathogenicity for 20 days. Lower temperatures rendered the virus inactive after 3–6 days. In phosphate buffer of pH 7·0, the virus lost its activity within 20 days. A dilution of 1 : 1,000 was pathogenic to 75% of inoculated mice, 1 : 10,000 to only 25% and 1 : 100,000 was completely inactive. The virus was pathogenic for calves and mice only, the latter being most susceptible at the age of 2–3 weeks. The only successful means of transmission was by the intranasal route.

The initial incubation period of 7–8 days was reduced by 127 passages to 5–6 days, death occurring within 24 hours of the appearance of symptoms. In earlier passages there were pneumonic foci, in subsequent passages bilateral diffuse lung lesions. Attempts to grow the virus on fertile eggs were unsuccessful. [See also *V. B.* **17.** 364.]

—E. G.

GAMBLES, R. M. (1949.) **Bluetongue of sheep in Cyprus.**—*J. comp. Path.* **59.** 176–190. [Author's summary copied *verbatim*.] **639**

A number of outbreaks of Bluetongue have been observed in sheep in Cyprus at recurrent intervals since 1924. The most serious was in 1943 when the virus was isolated and identified. The symptoms observed in Cyprus are described and correspond closely with those described from South Africa.

The virus was studied in the laboratory, but attempts to attenuate it by serial passage through sheep were unsuccessful. Various vaccine strains received from Onderstepoort were tested, but the only one which gave satisfactory protection under Cyprus conditions was the original Cyprus virus attenuated at Onderstepoort by serial passage through chick embryos. This egg-attenuated vaccine was used with success in subsequent outbreaks of the disease in 1946 and 1947.

ALEXANDER, R. A. (1947.) **The propagation of blue-tongue virus in the developing chick**

embryo with particular reference to the temperature of incubation.—*Onderstepoort J. vet. Sci.* **22.** 7–26. **640**

To produce the maximum titre of virus in eight-day-incubated hens' eggs infected *via* the yolk sac, the inoculum must contain 500 M. I. D. of virus. The eggs must then be incubated at 35°C. for 24 hours, then at 32·1°C., and the dead embryos are harvested on the third and fourth days after injection.—W. R. Bett.

Alexander, R. A., Haig, D. A., & Adelaar, T. F. (1947.) **The attenuation of bluetongue virus by serial passage through fertile eggs.**—*Onderstepoort J. vet. Sci.* **21.** 231–241. **641**

A strain of bluetongue virus had become attenuated following 100 serial passages through chick embryos. In order to determine the influence of temperature of incubation on attenuation a second strain of virus was adapted to the chick embryo and its development at varying incubation temperatures was studied.

In the earlier stages of the series multiplication was obtained only at 33·6°C. After three serial passages at 33·6°C., however, it could be passaged with ease at 35·0°C. and at 32·1°C., but no multiplication occurred at 38°C. even after 50 serial passages at 33·6°C. Attenuation occurred more rapidly at 32·1° and 33·6°C. than at 35·0°C. There was little difference in the titre of virus produced at the various temperatures, but the highest titres and highest mortality of chick embryos were obtained by incubation at 35·0°C. followed by transfer to 32·1°C.

The application of these findings to the mass production of vaccine is discussed.—M. C.

Morcos, Z. (1948.) **Swine fever—a case report. [Rabbit passage.]**—*J. Amer. vet. med. Ass.* **113.** 460–462. **642**

In an outbreak of swine fever in Egypt an attempt was made to infect white mice and rabbits by subdural inoculation. No conclusive results were obtained, but further attempts are to be made when a supply of rabbits becomes available.

—M. C.

Dima, G., Galea, M., Muntiu, N., & Turburi, A. (1947.) Recherches sur la vaccination contre la peste porcine à l'aide du vaccin L.O.H. obtenu par l'adsorption du virus sur l'hydroxyde d'alumine. (Etude expérimentale et résultats préliminaires obtenus dans la pratique.) **[Swine fever aluminium adsorbate vaccine.]**—*Bull. Off. internat. Epiz.* **28.** May. 168–183. **643**

Tissue vaccines inactivated by formalin, oil of eucalyptus and chloroform have been prepared and tested on a small scale. They gave a useful degree of immunity, but have not been used in the field because the local reaction at the site of injection was very severe and because of the large number of pigs required for large-scale production.—M. C.

MacIntyre, A. B., Trevan, D. J., & Montgomerie, R. F. (1948.) **"A new virus disease of dogs". [Correspondence.]**—*Vet. Rec.* **60.** 102–103. **644**

Since 1944 cases of encephalitis in dogs differing from nervous distemper have been encountered with increasing frequency. In 1946 Dr. Margaret Scheitlin on a visit from Switzerland drew attention to a hardening of the foot pads which she had observed in cases of encephalitis. The occurrence of this lesion was confirmed in England and the authors tentatively called the condition "hard pad disease".

The disease is under investigation.—M. C.

Greatorex, J. C. (1949.) **The use of "Amphotrophin" (hexamine camphorate—Bayer) in the treatment of so-called "hard pad disease" in dogs.**—*Vet. Rec.* **61.** 408. **645**

Two dogs five and seven months old had been affected with "hard pad disease" for three months and one month respectively. In each case slow intravenous injections of amphotrophin (in graduated doses of 2, 4, 6 and 8 ml. at 48-hour intervals in the first case and in the second two similar injections of 2·5 and 5 ml.) were followed by rapid improvement. Both dogs recovered. While the treatment was suggested by the effect of urotropine in rendering the blood-brain barrier permeable to tetanus antibodies the action of amphotrophin is still being investigated.—K. G. T.

Wagener, K. (1948.) Die Kriegsverseuchung Deutschlands mit Geflügelpest in epizootologischer Betrachtung. **[The epizootic of fowl pest in Germany during the war.]**—*Berl. Münch. tierärztl. Wschr.* No. 6. pp. 61–65. **646**

Numerous local outbreaks of fowl pest occurred in Germany during the last war. The first was near Hanover in 1941. Its origin could not be traced, but it was considered that it probably came from Italy through the medium of seasonal Italian land workers. The second outbreak occurred in Silesia, late in 1941 and was traced to a consignment of live pheasants imported from Hungary for the purpose of enriching German stocks. Soon afterwards similar outbreaks of like origin occurred elsewhere in Southern Germany and Austria. Additional outbreaks were observed in many parts of Germany, these being traced to frozen poultry carcasses also imported from Hungary. Hungary was believed to have been free from fowl pest for 27 years before 1941 and W. suggests that infection was introduced there from Lombardy in Italy where it has been enzootic for many years. W. com-

ments that a functional International Office des Epizooties could have been instrumental in preventing the outbreaks. [The disease is now generally agreed to have been Newcastle disease.] —J. E.

WOLFE, D. M., KORNFELD, L., & MARKHAM, F. S. (1949.) **Simplified indirect complement-fixation test applied to Newcastle disease immune avian serum.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 490–494. **647**

The indirect haemolytic complement-fixation test of Rice was simplified by using the common "serum or antigen-dilution" technique and by observing 100% haemolysis instead of the more detailed quantitative method for the standardization of all test components. The results obtained with this simplified method agreed well with the results of parallel haemagglutination inhibition tests.—L. M. MARKSON.

DINTER, Z., BAKOS, K., & ANGERMAIR, M. (1948.) Ueber den Haemagglutinationstest bei atypischer Hühnerpest. [**Haemagglutination test in atypical Newcastle disease.**]—*Berl. Münch. tierärztl. Wschr.* No. 3. pp. 32–33. **648**

The haemagglutination test of Hirst was applied to the diagnosis of Newcastle disease, using haematological slides such as are used for the determination of blood groups. Virus was obtained from infected fowl embryos. If the test serum comes from fowls having Newcastle virus antibodies the reaction is inhibited. In practice the test has been found to be fairly accurate.—J. E.

HANSON, R. P., UPTON, E., BRANDLY, C. A., & WINSLOW, N. S. (1949.) **Heat stability of hemagglutinin of various strains of Newcastle disease virus.**—*Proc. Soc. exp. Biol., N.Y.* **70.** 283–287. [Authors' conclusion copied *verbatim.*] **649**

The stability of the hemagglutinin of different Newcastle disease virus strains, when subjected to increased temperatures, has been found to vary over a wide range. The stability of the hemagglutinin of 1 isolate was destroyed at 56°C in a period as short as 5 minutes, and that of another was diminished only after 6 hours exposure. The stability of the hemagglutinin of Newcastle virus is discussed in relationship to influenza viruses. A relation of heat stability of strains to place and time of isolation is observed.

BANG, F. B. (1949.) **Formation of filamentous forms of Newcastle disease virus in hypertonic concentration of sodium chloride.**—*Proc. Soc. exp. Biol., N.Y.* **71.** 50–52. [Author's summary copied *verbatim.*] **650**

In 4 separate experiments it has been shown that the virus of Newcastle disease of chickens probably has a spherical shape when in water or ·8% saline. If the concentration of saline is increased to two per cent or more the virus becomes filamentous. It may be fixed with osmic acid at this concentration and will then retain its shape when placed in water. It reverts to the spherical form when replaced in water without previous fixation. No loss of infectivity was detected during these changes in concentration of saline.

KILHAM, L. (1949.) **A Newcastle disease virus (NDV) hemolysin.**—*Proc. Soc. exp. Biol., N.Y.* **71.** 63–66. [Author's summary copied *verbatim.*] **651**

A hemolysin associated with the virus of Newcastle disease is described. The activities of this hemolysin paralleled those of the NDV hemagglutinin in regard to adsorption and elution from hen erythrocytes, inhibition by specific immune serum, inactivation by moderate heating, and in its behavior with erythrocytes of different animal species. A suggestion is made that similarities in behavior between the hemolysin associated with NDV and that associated with mumps virus are further indication of possible relationship between the 2 viral agents.

KILHAM, L., JUNGHERR, E., & LUGINBUHL, R. E. (1949.) **Antihemagglutinating and neutralizing factors against Newcastle disease virus (NDV) occurring in sera of patients convalescent from mumps.**—*J. Immunol.* **63.** 37–49. [Authors' summary copied *verbatim.*] **652**

When sera of 22 mumps patients were tested against Newcastle disease virus (NDV), 13 gave significant responses by neutralization test and 11 by inhibition of hemagglutination. Of 23 control patients, with undiagnosed diseases of the central nervous system, 3 gave responses by neutralization test but none by antihemagglutination test against NDV. The neutralizing capacity of mumps sera against NDV was impaired or destroyed by heat, whereas the antihemagglutinating factor was relatively heat-stable.

Hypotheses are advanced regarding the nature and significance of serologic reactions obtained between mumps sera and NDV. It is suggested that the serologic diagnosis of Newcastle disease in man be made with caution in the absence of virus isolation.

KOMAROV, A., GOLDSMITH, L., & KAHANA, J. (1948.) [**Combined immunization against Newcastle disease and fowl pox.**]—*Refuah vet. Palestine.* **5.** 77. [English summary: p. 108.] **653**

It has been the custom in Palestine to immunize against fowl pox at the age of 2–2½ months, and against Newcastle disease at 3–3½ months. It was observed that the reaction to Newcastle disease vaccine had usually subsided by the 10th day while the reaction to fowl pox

vaccine did not commence until the 12th day. Tests were made to determine whether inoculation against both diseases could be done at the same time without causing unduly severe reactions. The two viruses were mixed together in equal quantities and inoculation was carried out by pricking the skin of the wing with a No. 11 sewing machine needle which had been dipped in the mixed vaccine. 20,000 birds four months old were vaccinated and were proved on test inoculation to be immune to both diseases. The reactions were no more severe than in fowls vaccinated separately with the two vaccines.—M. C.

GINSBERG, H. S., & HORSFALL, F. L., Jr. (1949.) **A labile component of normal serum which combines with various viruses. Neutralization of infectivity and inhibition of hemagglutination by the component.**—*J. exp. Med.* **90.** 475–495. [Authors' summary copied *verbatim.*] **654**

A labile component present in the serum of human beings, guinea pigs, and rabbits neutralizes the infectivity of mumps, Newcastle disease, influenza A and B viruses. The labile component of these sera and of mouse serum also inhibits hemagglutination of chicken RBC by these viruses. The component is inactivated by heating at 56°C. for 30 minutes and upon storage at 4°C. for periods longer than 2 weeks. The virus-neutralizing and hemagglutination-inhibiting properties result from serum component-virus combination in the presence of calcium. The combination is stable, and does not undergo spontaneous dissociation. Partial separation of virus can be brought about by heating mixtures held for 24 hours or by removal of calcium ions with sodium citrate. The labile serum component appears to be distinct from hemolytic complement.

GINSBERG, H. S., & HORSFALL, F. L., Jr. (1949.) **A resistant variant of mumps virus. Multiplication of the variant in the presence of inhibitory quantities of Friedländer bacillus polysaccharide.**—*J. exp. Med.* **90.** 393–407. [Authors' summary copied *verbatim.*] **655**

Serial passage of mumps virus in the presence of inhibitory quantities of the capsular polysaccharide of Friedländer bacillus type B results in the appearance of a variant strain of the virus. Multiplication of the variant virus is not inhibited by the polysaccharide. A similar resistant variant is obtained with polysaccharide in a single cycle of multiplication when very large inocula of mumps virus are employed. The resistant variant is indistinguishable from the parent strain as to infectivity, reactivity with erythrocytes, and immunological properties, but appears to have a somewhat slower rate of multiplication. Serial passage of the resistant variant in the absence of polysaccharide results in the reappearance of a sensitive strain. It is suggested that mumps virus populations are inhomogenous; that naturally occurring variants are present in such populations and possess distinctive properties; that the use of a chemical inhibitor of mumps virus multiplication makes possible the selection of a variant possessing a predictable property. The findings are discussed in relation to the mechanism of inhibition of mumps virus multiplication by polysaccharide.

DE ROBERTIS, E., & SCHMITT, F. O. (1949.) **An electron microscope study of nerves infected with human poliomyelitis virus.**—*J. exp. Med.* **90.** 283–289. [Authors' summary copied *verbatim.*] **656**

Sciatic nerves of rhesus monkeys infected with CAM and Wis. '45 strains of human poliomyelitis virus were fixed in formalin, sectioned, fragmented, and examined in the electron microscope.

Most of the neurotubules of nerves infected with the CAM strain have normal appearance but a very small number show the presence of dense particles irregularly aligned within the edges of the neurotubules. The diameters of the particles range between 160 and 500 Å, the mean being 330 Å. The particles were found in regions along the nerve which varied with the time after infection, indicating a central movement of the morphological alteration of the order of 2 mm. per hour. Relatively abundant dense particulate material was found in nerves infected with Wis. '45 strain virus and the particles were chiefly attached to the edges of the neurotubules and in the adjacent areas of the field. The dense particles appear to be associated with the virus infection but no further characterization is possible at this time.

VAN ROOYEN, C. E., & SCOTT, G. D. (1949.) **Electron microscopy of typhus rickettsiae.**—*Canad. J. Res.* Sect. E. **27.** 250–253. [Authors' conclusions copied *verbatim.*] **657**

Electron microscope photographs of *R. prowazeki*, *R. mooseri*, *R. rickettsi*, *R. akari*, and *R. burneti*, have revealed certain differences in size and other morphological features. *R. burneti* has revealed internal structure of a pattern more striking than in other rickettsiae examined. *R. rickettsi* and *R. akari* appear to be morphologically similar. Structurally, the rickettsiae resemble the bacteria more closely than the viruses. Evidence of binary fission has been reported in rickettsiae.

DODDANANJAYYA, R. (1949.) **Incidence of Q fever in eastern Washington.**—*Publ. Hlth Rep. Wash.* **64.** 1230–1236. [Author's summary slightly amended.] **658**

Q fever exists in eastern Washington in both

human beings and animals. Six of 289 samples of human sera examined contained Q fever complement-fixing antibodies, in titers of 1 : 8 to 1 : 128. Three of the cases in human beings were among students of the College of Veterinary Medicine who had been in close contact with animals. Three of the persons whose sera were positive by the complement-fixation test for Q fever had no occupational contact with animals, and their histories gave no indication of previous respiratory infection suggestive of Q fever. Nine of 327 samples of cattle sera contained Q fever antibodies, 2 in high titers.

See also absts. **686** (in avian tumours); **814-815** (Gold Coast, Reports); **818** (Zanzibar, Report); **819** (Sudan, Report).

IMMUNITY

IOFFE, V. I. (1947–48.) **General non-specific resistance to infection.**—*Amer. Rev. Soviet Med.* **5.** 41–48. [Author's conclusions copied *verbatim.*] **659**

One of the problems in immunologic analysis of infectious processes is the study of general non-specific resistance of the host to infection.

This paper presents the theoretical basis of the principles and methods of investigating the general host resistance to infection. Tests based on these proposed principles and methods are described and results evaluated.

DE KROMME, L., & VAN DER SPEK, L. A. M. (1949.) **The significance of iso- and auto-immunization for pathology.**—*Acta med. scand.* **134.** 454–461. [In English. Authors' summary slightly modified.] **660**

Congenital malformations and erythroblastosis observed in newborn children of mothers who during pregnancy suffered from an infection, (rubeola) are related by the authors to auto-immunization in respect of A- and B- factors. The significance of the topographical distribution of the blood-factors over the different organs is pointed out. The importance of organ-specific antigens is stressed.

Experiments are described which serve as basis for a discussion concerning the possibility of auto-immunization, setting in under the influence of infections, and related to a number of diseases in adults such as congenital syphilis, paroxysmal hemoglobinuria, hemolytic icterus and rheumatoid arthritis.

Finally the question is raised whether certain cases of habitual abortion, in which no blood group antagonism exists between mother and child, result from sensitization by placenta-specific antigens.

BURNET, F. M., & FENNER, F. (1948.) **Genetics and immunology.**—*Heredity.* **2.** 289–324 **661**

After differentiating between the biochemical and biological approaches to immunology, the authors, favouring the latter, define with brief accounts: antigen, antibody, multivalent combination of antigen and antibody, precipitation, agglutination, haemolysis, complement fixation and anaphylactic sensitization reactions.

The specificity of antibodies is considered. If antibodies are prepared against red cells of two individuals (X and Y), and the anti-X antibody is absorbed with the cells of the individual Y, and the anti-Y antibody absorbed with X cells, the antibodies may then be tested against both X and Y. If absorption of one antibody with one type of cell adequate to remove all antibody activity against that cell type does not result in exhausting the serum of its capacity to react with the alternative cell type, then it can be said that X and Y have antigenic differences. Such antigenic differences may be caused by multiple antigenic factors in the cells, only some of which are common to both cell types (*e.g.* ABCD in one case and ABEF in the other). An alternative explanation is that the population of antibody molecules produced by an antigen (let it be called A) is not uniform but contains some antibody which may be differentiated by absorption with related antigens (A′, A″, etc.). The specificity of antibodies depends upon the species immunized; *e.g.* rabbit antibodies are more specific than those from horses; children manufacture more specific antibodies than adults. Where it is possible to immunize another animal of the same species (*i.e.* in red cell investigations) the antibodies are more specific than if a different species is used.

The six main human blood groups, O, A_1, A_2, B, A_1B, A_2B are interpretated as being dependent on four parallel allelomorphs, O, A_1, A_2, B, of which the last three are dominant over O. The blood group substances (mucoid in constitution) are secreted in water-soluble form in the secretions of most, but not all, individuals. The capacity to secrete is inherited by simple mendelian laws, secretor capacity being dominant over non-secretor. [It has recently been shown that, in general, non-secretors of the ABO substances carry the Lewis blood group antigen in the red cells, whereas secretors do not.]

The A and O substances may also be found in the gastric mucosa of pigs and in the secretions, but not in the cells, of the *Macaca* monkey. The latter also carry the appropriate antibodies in the serum. Certain sera recognizing the O antigen have been found naturally in bovines and by immunization of goats with *Shigella.* These sera

appear to recognize the O substance in A and B cells which from family studies would seem to be homozygous. This has been explained by subdividing the A and B groups into "pleiades" (A_5, A_4, A_3, etc.) in decreasing order of reactivity with anti-O serum; these represent successive mutations from pure Group O to pure Group A. There is partial dominance between adjacent genes, and complete dominance between distant ones. [A more recent explanation is that the anti-O antibodies described here are not directed against the O substance, but against a more primitive gene, H, present in human cells, but less masked by the O substance than A and B. Such antibodies should be termed anti-H. The few true anti-O antibodies which are known recognize the O substance regularly.]

The M, N, and P groups are mentioned and the Rh groups described. The inheritance of the latter is determined by three genes so closely situated on the chromosome that they are inherited as a unit. Each gene has two common allelomorphs (C and c; D and d; E and e) and some rare ones (*e.g.* C^w, C^u, C^v, D^u). Each of these antigens may provoke the formation of a specific antibody, if it enters an individual in whom this antigen is not naturally present. There is considerable variation in the susceptibility of individuals to immunization by these antigens. The antigens also are variable in their power to produce antibodies, D being the most powerful, and c, d and e, even when homozygous, very weak.

The invariable and natural occurrence of the anti-A and anti-B agglutinins in the serum of human beings in whom the homologous cell antigen is absent, is afforded three possible explanations. (1) That the blood group substance may absorb out the homologous agglutinin, the heterologous antibody remaining; (2) a temporary antigenic stimulus at birth which leaves agglutinins active in the serum, and (3) that the distribution of both agglutinogens and agglutinins is determined genetically. None of these explanations is free from objection.

Several mammals other than man contain natural isoagglutinins. A number of intra-species antigenic differences in the red cell are known. Some of the human red cell antigens are found in other mammals. It has been shown in cattle that some twins having a common circulation subsequently carry two cell types (the definitive type and that of the twin) permanently and harmlessly.

Multiple antigenic factors have similarly been demonstrated in the red cells of birds. It can be shown that the pearlneck dove and ring dove share some common red cell antigens, but each has species specific antigens in addition. When some related species of doves are crossed there may appear in the cells of the hybrid an antigenic substance not present in either parental species. Indeed in duck hybrids it has been possible to produce antibodies against the hybrid substance in the parents of the hybrids. It may be that these hybrid substances are explained by a modification of the stereochemical properties of the inherited antigens rather than an abnormality in gene action.

Species specificity is also demonstrable with serum proteins, and it seems that the inheritance of protein antigen characteristics is similar to that of cellular antigens. The protein antigens are strictly species specific and differences within the species are rare or non-existent; in cellular antigens, on the other hand, there are not only apparent relationships between widely differing species (*e.g.* Forssman antigens) but also heritable intra-species differences (*e.g.* blood group antigens).

The failure of tissue transplants to survive when attached to different individuals in the same species (or of another species) may also be explained by immunological processes. The reaction to a second graft from the same donor is greatly accelerated, whereas that from a different donor is not; this implies that a secondary immune response is operative. It has been shown that there are a number of skin antigens in rabbits which are unrelated to red cell antigens, but some of which are shared with the leucocytes.

Susceptibility to immunization may also be based on inherited characters and such genetic influence has been found in rabbits and g. pigs. A similar influence has been demonstrated in the familial nature of allergic conditions in man and in experimental skin-sensitization of g. pigs with chemicals.

In considering the mechanism of antibody production, the authors point out that horse antibodies are of two kinds, one a large and asymmetrical globulin molecule (*e.g.* anti-pneumococcal) and the other a small molecule (*e.g.* diphtheria antitoxin). Antibodies in man and rabbits are generally of the latter type. The authors outline the basic features of antibody production and fate of the antibody, drawing attention to the difference in response to a toxoid on the one hand and to a particulate antigen on the other.

The cells which may produce antibody are the macrophages, lymphocytes or plasma cells. There is evidence to show that after local infiltration of an antigen, antibody production is marked in the lymph nodes draining the area. It has also been shown that in the immune animal an adrenal cortical hormone may stimulate release of gamma globulin from the lymphocytes followed by a dis-

appearance of the latter and an increase in circulating antibody titre.

The hypothesis of antibody production favoured by the authors is that of an adaptive enzyme process. Normally enzymes exist in the reticulo-endothelial cells which destroy certain effete or damaged cells (*e.g.* red blood cells). There is, doubtless, some mechanism, determined genetically, whereby the reticulo-endothelial elements may distinguish between components of "self" which are to be destroyed, and "foreign" components against which antibodies are to be manufactured. Such a distinction may be brought about by "markers" which are determined by genes. The enzyme pattern in the antibody-producing cells receives an imprint from the antigen which causes it to be adapted to specific antibody production. The deformed enzyme pattern which results in the availability of antibody may persist for some time in the absence of the antigen.—G. Fulton Roberts.

Bruner, D. W., Brown, R. G., Hull, F. E., & Kinkaid, A. S. (1949.) **Blood factors and baby pig anemia.**—*J. Amer. vet. med. Ass.* **115.** 94–96. **662**

It is known that the pig resembles the horse in the transfer of antibodies through the colostrum so it is possible that some cases of piglet anaemia could arise in the same way as haemolytic icterus in foals. In order to test this point, three sows were immunized with citrated blood from the boar to which they had been mated. The sows developed both haemagglutinin and haemolysin titres.

The three sows farrowed normally, the piglets being perfectly healthy at birth with erythrocyte counts above 5 million per c.mm. However, all the 21 piglets died within 42 hours of birth. They had developed extreme anaemia with erythrocyte counts of less than one million. It was observed that the rapidity of onset and severity of the haemolytic icterus was related to the haemolysin titre of the dam. In cross matching tests it was found that the erythrocytes of all the piglets were similar to those of the boar and it was not possible to study a litter the members of which were divided in their blood types between those of the sow and those of the boar. Normal piglets allowed to be suckled by one of the sensitized sows 48 hours after farrowing and after the death of its own litter had no anaemia, nor did piglets born to non-immunized sows served by the same boar. It is concluded that blood factors can cause losses in baby pigs, but the extent to which this occurs in the field is uncertain.—J. A. Nicholson.

Eisen, H. N., & Keston, A. S. (1949.) **The immunologic reactivity of bovine serum albumin labelled with trace-amounts of radioactive iodine (I^{131}).**—*J. Immunol.* **63.** 71–80. [Authors' summary copied *verbatim*.] **663**

In vitro studies have been carried out with bovine serum albumin which was tagged with radioactive iodine (I^{131}) by direct iodination or by coupling with radioactive *p*-iodophenyldiazonium chloride. The tagged proteins proved capable of determining relative antibody concentrations in antisera for the native protein. Antisera directed against native bovine serum albumin did not here distinguish a tagged bovine serum albumin preparation from native bovine serum albumin in quantitative precipitin studies.

Rigdon, R. H. (1949.) **Effect of antihistamine on the localization of trypan blue in xylene treated areas of skin.**—*Proc. Soc. exp. Biol., N.Y.* **71.** 637–639. [Author's summary copied *verbatim*.] **664**

The hyperemia that follows the local application of xylene apparently is not modified by the intravenous and intraperitoneal injections of the antihistamine preparations, Pyrrolazote and Thenylene. Likewise, the localization and concentration of trypan blue in the xylene treated areas of skin are not affected by these preparations of antihistamine. Trypan blue also localizes and concentrates in areas of skin injected intradermally with these preparations of antihistamine.

Winter, C. A. (1949.) **Failure of antihistamine drug "Phenergan" to protect against pulmonary edema.**—*Proc. Soc. exp. Biol., N.Y.* **72.** 122–124. [Author's summary copied *verbatim*.] **665**

The antihistaminic drug, Phenergan (3277 R.P.), in doses of 20 or 40 mg per kg, failed to protect rats or guinea pigs against the pulmonary edema induced by injection of ammonium chloride, and also offered no protection against epinephrine-induced pulmonary edema in guinea pigs.

See also abstr. **572** (Johne's disease); **616-617** (F. & M. disease); **621** and **624** (rabies); **629** (neurotropic viruses); **636-637** (rinderpest vaccine); **643** (swine fever vaccine); **647** and **652** (Newcastle disease); **653** (combined fowl pox and Newcastle disease vaccine).

PARASITES IN RELATION TO DISEASE [GENERAL]

Collet, P., & Raboutot, J. (1947.) L'hexachlorocyclohexane quelques applications en médecine vétérinaire. **[Hexachlorocyclohexane in veterinary practice.]**—*Bull. Soc. Sci. vet., Lyon.* **49.** 104–113. **666**

The authors discuss in considerable detail the properties of benzene hexachloride (hexachlorocyclohexane), including its insecticidal properties.—J. E.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

WATKINS, T. C., & NORTON, L. B. (1947.) **A classification of insecticide dust diluents and carriers.**—*J. econ. Ent.* **40.** 211–214. **667**

An investigation of the physical and chemical properties and inherent toxicities of 75 materials used as diluents and carriers in insecticidal dusts showed that it was desirable to work out a system of classification to aid cataloging and to give an over-all picture of materials which were apparently very different.

Two principal groups of materials are recognized: finely ground material of botanical origin, and minerals, both synthetic and natural. As a general rule the materials of botanical origin are used as carriers for absorbing or adsorbing liquid insecticides and require additional quantities of diluents to meet the physical requirements of dusting machinery. The vast majority of the diluents in use today belong to the mineral group, which are sub-divided into the elements, oxides, carbonates, sulphates, silicates, phosphates, and an indeterminate group.—W. MOORE.

BLOCK, S. S. (1948.) **Residual toxicity tests on insecticidal protective coatings.**—*Soap & Sanit. Chem.* **24.** No. 4. 155, 157, 159, 161; 207; 213. **668**

When an insecticide is incorporated in a suitable surface coating it gradually becomes more and more effective because of the continued deposition of the insecticide at the surface of the coating by gradual precipitation from a supersaturated solution of the insecticide in the coating vehicle.—W. MOORE.

MOSNA, E. (1948.) *Culex pipiens autogenicus*-DDT-resistenti e loro controllo con Octa-Klor e esaclorocicloesano. **[Control of D.D.T.-resistant *Culex pipiens autogenicus* with octachlor and hexachlorocyclohexane.]**—*R.C. Inst. Sanit. publica, Roma.* **11.** 425–432. [English, French & German summaries, abst. from English summary.] **669**

A description of observations on D.D.T.-resistant mosquitoes, *Culex pipiens autogenicus*.

DELPY, L. P. (1949.) Révision par des voies expérimentales du genre *Hyalomma* C. L. Koch 1844. **[A revision of the genus *Hyalomma*.]**—*Ann. Parasit. hum. comp.* **24.** 97–109. **670**

In a study of the genus *Hyalomma*, D. used not only dead specimens but bred large numbers of the ticks which enabled him to recognize characters which were constant and hereditary and to distinguish them from variable characteristics. This method of study has enabled D. to distinguish and describe ten species, including the new species *H. transiens*. He considers that the 50 odd species previously described are only variations of a small number of true species, to which a key is given.—M. C.

CROSS, H. F., & SNYDER, F. M. (1948.) **Field tests of uniforms impregnated with mite toxicants: I. Protection studies.**—*J. econ. Ent.* **41.** 936–940. [Authors' summary copied *verbatim*.] **671**

In a search for chemicals more resistant to washing than benzyl benzoate, the material adopted as a standard by the Army for impregnating uniforms to prevent attachment by mites, the following materials were found to be especially promising: Benzil, 2-thenyl benzoate, *p*-cresyl benzoate, diphenyl carbonate, and 2-thenyl salicylate. Diphenyl carbonate and 2-thenyl salicylate gave complete protection and benzil and *p*-cresyl benzoate gave a high degree of partial protection through more washings than the other materials. Diphenyl carbonate gave complete protection and benzil and 2-thenyl salicylate gave a high degree of protection through more days of aging than the other materials. 2-thenyl benzoate was less effective in washing tests, but in aging tests afforded a high degree of protection over a longer period of time than diphenyl carbonate or *p*-cresyl benzoate.

See also absts. **597** (insects transmitting dourine); **723** (beetles) **813** (Canada, Report); **814-815** (Gold Coast, Reports); **819** (Sudan, Report).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

DUTHY, B. L., & VAN SOMEREN, V. D. (1948.) **The survival of *Taenia saginata* eggs on open pasture.**—*E. Afr. agric. J.* **13.** 147–148. **672**

Calves protected from previous infection were grazed on pasture which had been artificially infected with eggs of *T. saginata*. The calves were killed at various intervals after experimental infection and the number of cysticerci counted. The findings indicated that the eggs will probably survive for a year on the two types of East African pastureland tested.—J. F. A. SPRENT.

EDGAR, S. A. (1949.) *Capillaria annulata* **(Molin, 1858) from the mucosa of the mouth of the domestic fowl,** *Gallus domesticus* **(Linn.).**—*J. Parasit.* **35.** 218. **673**

Adult specimens of *C. annulata* were found embedded in the buccal mucosa of three adult chickens. Their presence was accompanied by inflammatory reaction and localized erosion. The occurrence of worms in this location may explain the observation that birds infected with this parasite will accept only soft foods.—J. F. A. S.

I. Royer, A., & Benoit, A. (1948.) Sur un nouveau dérivé de la phénothiazine: la stronglamine. Son action sur les strongyloses animales. [**Stronglamine, a derivative of phenothiazine.**]—*Rev. Méd. vét., Lyon et Toulouse.* **99.** 253–265. **674**

II. Guilhon, J. (1949.) Recherches sur l'action strongylicide d'un dérivé soluble de la thiodiphènylamine. [**Anthelmintic action of a derivative of phenothiazine.**]—*Rec. Méd. vét.* **125.** 241–244. **675**

I. R. prepared a soluble derivative of phenothiazine, by converting it to a disulphonate. B. carried out field trials on several groups of sheep and calves affected with parasitic bronchitis and on a few horses with strongylosis using a 10% solution given intravenously. According to the somewhat incomplete case records nearly all the parasitized animals were promptly cured. Toxicity tests on laboratory and farm animals indicated a therapeutic index of at least 50.

II. G. treated strongylosis in ten horses with the derivation used in I and obtained completely negative results, as judged by examination of faeces. A follow-up treatment with phenothiazine was fully effective.—J. E.

Edgar, S. A. (1948.) **Anthelmintic activity of sodium fluoride in chickens.**—*Amer. J. vet. Res.* **9.** 396–398. **676**

From what appear to have been adequate trials, sodium fluoride proved to be unsuitable for use in fowls, because it was toxic at a low effective dose.—J. E.

Allen, R. W., & Jones, L. D. (1949.) **The incidence of ascarids (*Ascaris lumbricoides*) in midwestern swine.**—*Proc. helminth. Soc. Wash.* **16.** 108–112. [Authors' summary copied *verbatim.*] **677**

During the course of anthelmintic tests conducted at Chicago, 505 pigs were examined for *Ascaris lumbricoides* by fecal examination involving mainly the direct smear method. The results, obtained in 1945 and 1947, showed that 35 percent of the pigs were passing *Ascaris* eggs in the feces.

Blair, H. E. (1949.) **Vermiplex, a new anthelmintic for dogs.**—*N. Amer. Vet.* **30.** 306–309. **678**

Vermiplex, a mixture of methylbenzene and diphenthane-70 given to 133 dogs proved to be effective against ascarids but less satisfactory against hookworms and tapeworms. The dosage used was 0·1 ml. methylbenzene and 0·1 g. diphenthane-70 per lb. body weight; repeated doses produced no toxic effects.—M. J. L.

Travis, B. V. (1947.) **Relative efficiency of six species of mosquitoes from Guam, M. I., as developmental hosts for *Dirofilaria immitis*.**—*J. Parasit.* **33.** 142–145. **679**

By feeding laboratory reared mosquitoes on dogs heavily infected with *D. immitis*, information was obtained regarding the fate of ingested microfilaria in six different species of mosquitoes. In the case of completely engorged *Aedes pandani* and *A. guamensis*, the larvae caused a fatal disintegration of the digestive system. *Culex* spp. were found to ingest more microfilariae per meal than *Aedes* spp. but development of the larvae to the infective stage was most often achieved in *Aedes guamensis*. The average number of infective larvae per mosquito and the percentage of mosquitoes which became infective decreased in the following order: *Aedes guamensis*, *A. pandani*, *Culex annulirostris*, *C. quinquefasciatus*, *A. aegypti*, *C. sitiens*.—J. F. A. Sprent.

Cheatum, E. L., & Cook, A. H. (1948.) **On the occurrence of the North American guinea worm in mink, otter, raccoon, and skunk in New York State.**—*Cornell Vet.* **38.** 421–423. **680**

Guinea worms, probably *Dracunculus insignis* (Leidy 1878) Chandler 1942, are reported from four different carnivorous mammals in New York State, namely from *Mustela vison*, *Lutra canadensis*, *Procyon lotor* and *Mephitis nigra*. The worm was in all cases removed from the subcutaneous tissues of the feet.—J. F. A. Sprent.

Caccavella, A. (1948.) Sui danni recati ad alcuni bovini dell'Africa Italiana dagli irudinei del genere Hararbdella. [**Leeches infesting cattle in Italian East Africa.**]—*Zooprofilassi.* **3.** No. 12. pp. 16–20. **681**

After a general discussion of effects produced by leeches on livestock, namely loss of blood and possible transmission of disease, C. describes two new species found on cattle at Harar, namely *Hararbdella caccavellai* and *H. trigonostoma*.

—M. C.

See also absts. **779** (prophylaxis); **811** (morphology); **816–817** (Mauritius, Reports).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

Lushbaugh, C. C. (1949.) **Infiltrating adenomatous lesions of the stomach, cecum, and rectum of monkeys similar to early human carcinoma and carcinoma *in situ*.**—*Cancer Res.* **9.** 385–394. [Author's summary slightly amended.] **682**

Previous observations on the occurrence of infiltrating hyperplastic gastric mucosal lesions in

rhesus monkeys which had ingested diesel motor lubricating oil are extended by additional examples of the disease. Similar lesions are produced in the colon by the same means. Two instances of similar but apparently naturally occurring gastric lesions in monkeys are reported. These lesions are described and their nature is discussed. Their similarity to human disease and, in several instances to human gastric and colonic carcinoma, is pointed out. These lesions are considered in the absence of incontrovertible proof not to be malignant neoplasms in spite of their morphological appearance.

BRINES, O. A., & JOHNSON, M. H. (1949.) **Hibernoma, a special fatty tumor. Report of a case.**—*Amer. J. Path.* **25.** 467–479. **683**

Probable and possible examples in the literature of neoplasms developing from a structure in human beings homologous with the hibernating gland are reviewed, and a further case is described of a tumour in the right scapular region of an 18-year-old negress. The tumour was composed of large cells, mostly 25–50μ in diameter, with centrally-placed nuclei containing fine and coarse chromatin and 1–3 nucleoli. The smaller cells contained fine and coarse granules, the larger cells small vacuoles or locules. Granules and locules stained black with osmic acid and were sudanophilic. In some cells, smaller locules appeared to condense or coalesce into larger locules, displacing the nucleus. There seemed to be a transition from multilocular to unilocular fat cells, of which a few were present. The tumour was lobulated. The water content was 73% approximately, the fat content 16·85%. The melting point of the fat was between 34° and 35°C., the iodine number 65. Of the total fat, over 80% was saponifiable, and 12% unsaponifiable.—E. COTCHIN.

PULLINGER, B. D. (1949.) **The significance of functional differentiation in mammary tumours.**—*Lancet.* **257.** 823–828. [Author's summary copied *verbatim.*] **684**

The convergence of two groups of observations led to the hypothesis that mammary tumour cells produce intracellularly an oestrogen-like substance or " mammogen ".

The first set of observations was based on attempts at assessment of the relationship of dosage and response between oestrone and the mammary glands of spayed mice at puberty. Results indicated that lobular-alveolar or acinus formation and secretion depended upon a specific stimulus applied in adequate quantity. In the absence of a specific stimulus there was no response.

The second set of observations concerned the known property of spontaneous mammary carcinomas of mice to differentiate into acini and produce secretion, and to retain these characteristics when grafted into ovariectomised female or male mice. The conclusion was reached that this response also is most probably due to intracellular production of an oestrogen-like substance.

In the case of inherited tumours of mice due to the Bittner agent it is conceivable that the agent in combination with mammary cells is producing some such substance; in the case of agent-free tumours the suggestion is made that a heritable change in chemical productivity has occurred in mammary cells resulting in the production by the cell of its own chemical stimulus to division and differentiation.

The hypothesis is examined in relation to the tumour problem in general and a forecast made of the intracellular impulses of some other types of tumour together with indications for testing its validity.

DI DOMIZIO, G. (1947.) Tumori ormonattivi degli animali domestici. [**Hormonal activity of tumours in domestic animals.**]—*Atti Soc. ital. Sci. vet.* **1.** 220–242. [English & French summaries.] **685**

The author suggests that ovarian tumours having hormonal activity should be considered as a separate group, subdivided into: (1) those which reproduce either follicular cells (feminizing) or luteal cells (masculinizing) and (2) those with heterosexual elements (including seminoma). A few case histories are given. He considers the extent of hormonal activity to be related to the degree of histological differentiation.—M. R. O.

CARR, J. G. (1946.) **An unexplained discrepancy between the actual and expected yield of virus from avian tumours and its implications.**—*Proc. roy. Soc. Edinb.* Sect. **B. 62.** 243–247. [Author's summary copied *verbatim.*] **686**

It is pointed out that the yield of virus from filterable fowl sarcomas at best corresponds to only one infective unit from 20 cells. With this is associated material physically, chemically, and serologically indistinguishable from the virus, but approximately 574 times greater in amount. Possible implications of this are discussed.

See also abst. **577** (vitamin A).

NUTRITIONAL AND METABOLIC DISORDERS

JOHANSSON, K. R., & SARLES, W. B. (1949.) **Some considerations of the biological importance of intestinal microörganisms.**—*Bact. Rev.* **13.** 25–45. **687**

A review of the role of micro-organisms of the alimentary tract in nutrition, but which specifically excludes consideration of the ruminal microflora. The synthesis of vitamins, coprophagy and refection are dealt with. There is a very good list of references.—M. C.

GALL, L. S. (1949.) **Effect of ration upon rumen flora of cattle and sheep.**—*J. Anim. Sci.* **8.** 619. [Only abst. given, copied *verbatim.*] **688**

A study was made of the kinds and numbers of rumen bacteria found in cattle and sheep on various practical and experimental rations. The animals tested included cattle and sheep on fattening and breeding rations and pasture; cattle on dairy rations and simplified diet; and sheep fed cobalt-deficient rations and purified diets containing urea as the sole source of nitrogen. The samples were mostly taken by stomach tube, but a few were obtained from fistulated animals. Bacteriological examinations of the rumen contents were made by direct bacterial counts, Gram stains, and anaerobic cultural series. The results of the studies showed marked similarities among animals of both species fed the same type of farm ration, even though the tests were conducted at various times, in various parts of the country. There were quantitative differences in the number of fast-growing organisms as the grain in the ration varied, but few qualitative variations appeared. Animals on pasture had a higher bacterial count and showed a few new organisms in the Gram stain in addition to the regular morphological types. Sheep fed purified diets gave a different bacterial picture than those on farm rations. Fewer types of organisms were seen on the Gram stain and culturability was better. Cattle on simplified rations gave a bacterial picture intermediate between the farm and purified diets, varying sharply with the composition of the ration. Cobalt-deficient sheep showed a simpler flora and lower bacterial count than animals on the same ration plus cobalt.

BEESON, W. M., MERTZ, E. T., & SHELTON, D. C. (1949.) **Effect of tryptophan deficiency on the pig.**—*J. Anim. Sci.* **8.** 532–540. [Authors' summary copied *verbatim.*] **689**

Tryptophan has been proven indispensable for growing Duroc weanling pigs by the use of a purified diet which was deficient in this amino acid. Lack of tryptophan decreases the feed efficiency and feed consumption, and causes a loss in weight in young pigs. Although the minimum level of tryptophan needed for optimum growth and feed efficiency is not known, a level of 0·4% of DL- tryptophan seems to be adequate to meet the normal requirement in pigs weighing 50 to 100 lbs. A purified diet has been formulated which supports a rate of growth equal to that obtained on a good natural grain ration.

BECKER, D. E., & SMITH, S. E. (1949.) **The metabolism of cobalt in lambs.**—*J. Anim. Sci.* **8.** 615. [Only abst. given, copied *verbatim.*] **690**

Two experiments, using lambs made cobalt-deficient by feeding a ration of shelled yellow corn, powdered whole milk, and cobalt-deficient grass hay, were conducted to determine the metabolic role of cobalt in ruminant nutrition. In test 1, the digestibility of the above ration was determined with six cobalt-deficient lambs and six positive control lambs which were being fed cobalt salts. Results indicated that the cobalt-fed lambs more efficiently digested the ether-soluble and the nitrogen-free extract fractions of the ration. However, the deficient-lambs showed a significantly greater coefficient of apparent digestibility for the fibrous fraction of the ration; an effect attributed to depressed feed intake. Apparently cobalt deficiency does not markedly affect the cellulose splitting microorganisms of the rumen. In test 2, fifteen deficient lambs were divided into six groups: I No treatment, II 10 mg. daily of pteroylglutamic acid injected, III 1 mcg. of vitamin B_{12} and 1 mg. of cobalt daily injected simultaneously, IV 15 U.S.P. units daily of Lilly liver extract injected, V 15 U.S.P. units daily of Lilly liver extract fed, and VI 1 mg. daily of cobalt fed. All injections were administered subcutaneously. Cobalt feeding gave the usual beneficial response; whereas, the negative controls continued to show a depressed appetite, body weight losses, and low hemoglobin level. Therapy with pteroylglutamic acid or vitamin B_{12} with cobalt were without effect. Subcutaneous injections of the liver extract were beneficial as measured by all criteria; however, oral dosage of the liver extract was of no therapeutic value. Preliminary attempts to concentrate the active principle from the liver extract by means of counter-current distribution were unsuccessful.

COMAR, C. L., SINGER, L., & DAVIS, G. K. (1949.) **Molybdenum metabolism and interrelationships with copper and phosphorus.**—*J. biol. Chem.* **180.** 913–922. [Authors' summary copied *verbatim.*] **691**

The dependence of low level molybdenum toxicity upon the dietary copper intake of the rat has been demonstrated.

The tissue distribution of Mo^{99} intravenously injected and orally administered to the bovine is presented, and the similarity between the behavior of phosphorus and molybdenum is shown. The interrelationships of molybdenum, copper, and phosphorus in the rat have been investigated with the radioisotopes of these elements. The results

suggest that the toxic action of molybdenum may be due to the following mechanisms, which are listed in probable order of decreasing importance: (a) Interference, due to a lowered liver copper, in enzyme systems necessary for skeletal metabolism; (b) inhibition of these enzyme systems by molybdenum; and (c) competition between phosphorus and molybdenum for deposition in the bone. It seems unlikely that the toxic action of molybdenum can be accounted for simply by a complex formation which renders other elements unavailable.

KUNKEL, H. O., & PEARSON, P. B. (1948.) **Magnesium in the nutrition of the rabbit.**—*J. Nutrit.* **36.** 657–666. [Authors' summary copied *verbatim.*] **692**

Weanling rabbits fed a diet deficient in magnesium exhibit within a period of three to six weeks a syndrome involving hyperexcitability, convulsions, hypomagnesemia, and retardation of growth. The addition of magnesium to the diet of rabbits that have ceased to grow results in a prompt resumption of growth. The vasodilatation characteristic of magnesium deficiency in rats and dogs was not observed in rabbits.

The magnesium content of the blood of rabbits fed a diet adequate to prevent symptoms of a magnesium deficiency was approximately 4·4 mg per 100 ml, while the level for the plasma was about 1·6 mg per 100 ml. On a diet containing 20 mg or less of magnesium per 100 gm of diet the level in the blood shows a progressive decline to about the 8th week of about 3·1 mg per 100 ml for whole blood and 1·0 mg per 100 ml for plasma.

SVANBERG, O., & SANDSTEDT, H. (1944.) Om alimentära orsaker till fertilitetsrubbningar hos nötkreatur, med särskild hänsyn till fosfatfaktorns betydelse. [**Nutritional causes of infertility in cattle, especially the importance of the phosphate factor.**]—*Svensk VetTidskr.* **49.** 383–509. [English & German summaries, abst. from English summary.] **693**

Among Swedish herds of cattle numerous cases occur of sterility and of conditions inhibiting pregnancy in cows. Between 20 and 30% of the cows return to service repeatedly.

From earlier studies of deficiency diseases in cattle, it was concluded that pregnancy disorders can be controlled to a considerable degree by the following measures: phosphate manuring, early cutting of the hay, feeding with phosphate supplements and the use of succulent foods. Experiments of this kind have been repeated in various parts of Sweden and have led to an improved reproductive performance of the cows.

Even where deficiency diseases do not exist the phosphorus content of hay and pasturage may be low, and in those districts the health of the animals can to some extent be maintained by improved feeding. The occurrence of sterility, however, has been associated with those farms where cattle later develop osteomalacia, milk fever, general inanition, pica, etc., and should not therefore be regarded as the consequences of these diseased conditions.

Hay-analyses gave average results of 0·51% P_2O_5 (0·22% P) on well-managed farms, such as the State Experimental Farms, while on farms where fertility is low in cows the P_2O_5 content of hay is 0·32% (0·14% P) and may be even lower.

The authors carried out experimental phosphate-feeding, with sodium-phosphate, on some 20 large and small farms in various districts where there had been a decline in fertility of cattle. The results were surprisingly favourable and agreed with corresponding results of THEILER (1933), THEILER *et al.* (1928) and BLACK *et al.* [*V. B.* **16.** 271], but on the other hand, ECKLES' statement (1932) that deficiencies of protein, etc., can accompany phosphate deficiency and lead to complications, does not appear to be of any very great importance in Sweden.

The authors recommend increased use of mineral supplements rich in phosphate, given at a rate of 50–75 kg. per cow per year for cows with a high milk yield and 12–25 kg. per cow per year for cows with a low milk yield, and the addition of phosphate to the diet of low milkers, dry cows and young cattle under all circumstances.

MCCLURE, F. J. (1949.) **Fluorine in foods. Survey of recent data.**—*Publ. Hlth Rep., Wash.* **64.** 1061–1074. [Author's summary copied *verbatim.*] **694**

A survey of recent analytical data for fluorine in foods has been compiled. The majority of foods found in the average diet contain from 0·2–0·3 ppm or less fluorine in the food as consumed. Tea and seafoods are notable exceptions, the former containing upwards of 75 to 100 ppm fluorine in the dry tea, whereas seafoods may contain 5–15 ppm fluorine. Cow's milk contains about 0·1–0·2 ppm fluorine. Fluoride added to the cow's ration or drinking water has no influence on the milk-fluoride. Fluorine in soil and water has little or no influence on the fluorine content of edible plant produce. Although the data are limited, it appears that natural food-borne fluorine is largely available for body assimilation.

Exclusive of drinking water, the average diet appears to provide 0·2–0·3 mg. of fluorine daily. However, it has been observed that an additional intake of fluorine during formative tooth life, via drinking water containing 1·00 ppm or slightly more fluorine, is a distinct dental health advantage. It is justifiable, therefore, to consider the possibility of a direct dietary fluoride supplement where

the drinking water does not provide a dental optimum quantity of fluorine.

IRVING, J. T. (1949.) **The effects of avitaminosis and hypervitaminosis A upon the incisor teeth and incisal alveolar bone of rats.**—*J. Physiol.* **108.** 92–101. [Author's summary copied *verbatim.*] **695**

The reactions of the alveolar bone and upper incisor teeth in hypervitaminosis and avitaminosis A have been studied in young rats.

In hypervitaminosis the rate of formation of bone is greatly reduced and active osteoblasts become much less prominent. Osteoclasts appear to be unaffected, with the result that the bones become abnormally thin and may disappear in places.

In the incisor teeth, only dentin formation is affected. This becomes decreased in appositional rate, the interfibrillar cementing substance is gradually reduced in amount, and the lingual odontoblasts begin to atrophy.

In avitaminosis, the alveolar bones show, in general, considerable over-production of new bone. This occurs in areas where apposition is usually seen, and also in situations where resorption normally occurs. In the early stages of the deficiency osteoclasts endeavour to overcome the latter unnatural apposition.

The teeth show changes already reported by other workers. These are chiefly in the dentin and odontoblasts, and excessive and faulty dentin formation occurs especially on the labial side.

The proposition is advanced that, in bone formation, vitamin A acts primarily on the osteoblasts. Excessive vitamin A in the diet depresses the action of these cells, while, when vitamin is lacking, these cells engage in disorderly overactivity. The reactions of the osteoclasts in avitaminosis are purely secondary in an attempt to prevent excessive bone formation. In hypervitaminosis these cells continue to act as usual. The odontoblasts, cells in the teeth comparable to the osteoblasts, react in a way similar to that of the bone-forming cells, producing less dentin in hypervitaminosis, and excessive amounts in avitaminosis.

KARNOFSKY, D. A., PATTERSON, P. A., & RIDGWAY, L. P. (1949.) **Effect of folic acid, " 4-amino " folic acids and related substances of growth of chick embryo.**—*Proc. Soc. exp. Biol. N.Y.* **71.** 447–452. [Authors' summary copied *verbatim.*] **696**

The " 4-amino " pteroylglutamic acids profoundly inhibit the growth of the chick embryo, with the production of the developmental abnormalities. These compounds are active in the range of 0·003 to 0·005 mg/egg, and their actions are not prevented by large doses of folic acid. The " 4-amino " folic acids with aspartic acid, threonine and alanine substituted for the glutamic acid are considerably less toxic but produce similar toxicological effects. Other compounds allied to folic acid are relatively non-toxic and do not possess the growth-inhibitory activity of the " 4-amino " compounds.

2,6-diaminopurine, at LD_{50} doses, does not seem to be an active growth inhibitor, but it produces a pale embryo, presumably deficient in hemoglobin.

HUGHES, L. E. (1947.) **A peculiar syndrome in cattle (with acute lameness) grazing on seeded wild white clover.**—*Vet. Rec.* **59.** 391–392. **697**

A few days after being allowed to graze on a field of mature wild white clover in the seeding stage a number of cases of severe lameness occurred in a herd of cattle. There was painful swelling of the coronets sometimes extending up to the knee or hock and temperatures up to 106°F. were registered. Foot and mouth disease was negatived. Gangrene supervened, necessitating the slaughter of seven of the cattle.

The cause was not determined, but the sprouted white clover was suspected to be the cause of the trouble. It is not known whether ergot was present in the field.—M. C.

HINDMARSH, W. L. (1947.) **Subterranean clover and infertility of sheep.**—*Yearb. Inst. Insp. Stk N.S.W.* 1947. pp. 49–52. **698**

H. discusses the results of the study of BENNETTS and his co-workers in Western Australia [*V. B.* **17.** 322] on the infertility of sheep caused by grazing on subterranean clover. The effects of the clover are infertility, dystocia, uterine prolapse, and lactation in maiden ewes and wethers. Similar, but less severe symptoms have been observed in several districts in New South Wales.—D. F. STEWART.

LAWRASON, F. D., & CRONKITE, E. P. (1949.) **Incidental finding of megaloblastic-like cells in bone marrow of one of two swine with macrocytic anemia and achlorhydria.**—*Yale J. Biol. Med.* **22.** 57–66. [Authors' summary and conclusions copied *verbatim.*] **699**

Hematological observations have been made on two swine for approximately seventeen months after exposure to atom bomb ionizing radiation at Bikini. Macrocytic anemia and achlorhydria were found in both animals and a hyperplastic, " megaloblastic-like " bone marrow in one.

The experimental background of these swine with special reference to nutrition, radiation, age, and disease has been considered. However, it

was not possible to evaluate conclusively the relative role that these conditions played in the production of the anemia and associated bone marrow findings.

See also abst. **768** (vitamin A in ghee).

DISEASES, GENERAL

DEL AGUA, S. O. (1948.) État sanitaire de l'Espagne en 1948. **[Infectious diseases of animals in Spain in 1948.]**—*Bull. Off. internat. Epizoot.* **30.** 269–272. **700**

Anthrax and blackleg still continue, but are being dealt with by vaccination and sanitation. For F. & M. disease a combined vaccine against the A and C types has been used on all cattle near the French border, with good results. An extremely virulent disease of poultry, believed to be Newcastle disease, has been raging in Catalonia and is being dealt with by using a vaccine. Swine fever seems to be the worst infectious disease, but since a decree has been made prohibiting the use of markets or common grazing grounds for pigs in affected areas, some progress has been made in its eradication. The use of vaccines other than the Government approved one is forbidden. —R. MACGREGOR.

GRANDCHAMP, G. (1949.) Statistiques et évaluations des dommages causés par les épizooties en Suisse de 1886 à 1946. **[Statistical assessment of losses through epizootics in Switzerland from 1886-1946.]**—*Thèse. Berne.* [Abst. from abst. in *Schweiz. Arch. Tierheilk.* **91.** 119–120. In French.] **701**

The abstract indicates that an effort has been made to estimate the losses caused by infectious diseases of livestock. The cash value is estimated to have varied from one million to nearly 200 million francs each year since 1886. The annual loss in recent years has declined as a result of better methods of disease control.—M. C.

BECK, J. D. (1948.) **X Disease. Proliferative stomatitis and esophagitis, hyperkeratosis.**—*Vet. Ext. Quart. Univ. Pa.* **48.** 3–6. **702**

This is a short account of the occurrence of hyperkeratosis in a herd of 76 cattle. Abortions, not caused by *Brucella abortus* were very numerous in the herd and in 1944–45 only two cows calved normally. Emaciation, diarrhoea and ulceration and proliferation of the buccal mucous membrane followed the abortions. Most of the affected cows died or were sold. The cause was not determined and attempts to transmit the condition to healthy cows failed.—M. C.

BOYD, C. L. (1948.) **A report on " XX disease " in Texas.**—*J. Amer. vet. med. Ass.* **113.** 463–464. **703**

Reports of five cases of hyperkeratosis in a herd of 84 cattle in Texas with P.M. findings in two of the cases. Only cattle under two years of age were affected. Various treatments were tried without success.—M. C.

CRUZ, W. O., DA SILVA, E. M., & DE MELLO, R. P. (1945.) Manifestações purpúricas na pele em cães anemiados com benzoato de estradiol. **[Purpuric manifestations in the skin in dogs made anemic with benzoate of estradiol.]**—*Rev. brasil. Biol.* **5.** 367–376. [English summary slightly modified.] **704**

Purpura is not a characteristic clinical sign of the experimental disease produced in the dog by high doses of estradiol benzoate.

The property of estradiol of producing purpuric lesions in the skin is secondary and intercurrent factors are necessary to its manifestation. When in solution in sesame [*Sesamum indicum*] oil purpura is obtained in practically all cases; in chaulmoogra [*Hydnocarpus* sp.], corn and cotton seed oils purpura was not observed; in soyabean oil slight purpura was ascertained. This same drug implanted in various tissues or dissolved in patava [*Oenocarpus batava*] (batana or common) oil rarely produces scarce purpuric lesions in the skin.

Considering the constant finding of intestinal hemorrhages, *thrombocytopenic enterorrhagia* should be the best expression to dominate the experimental pathologic picture produced by estradiol benzoate.

FROST, I. (1949.) **Some observations on the use of leucotropin [in posterior paralysis of dogs.]**—*Brit. Vet. J.* **105.** 394–395. **705**

Leucotropin contains hexamine, sodium salicylate, caffeine and phenylcinchoninate of hexamine. This is a note on the treatment of three cases of paraplegia in dogs. After three subcutaneous injections of 2 ml. each, given within 24–48 hours of the onset of illness, they recovered. Useful results are said to have been obtained in post-distemper complications.—J. O. L. KING.

EADS, F. E. (1949.) **The clinical use of sulfamerazine in infections in dogs and cats. A clinical report.**—*N. Amer. Vet.* **30.** 244–249. **706**

E. claims that sulphamerazine (2-sulphanilamido-4-methylpyrimidine), given orally to 52 dogs and two cats in daily divided doses of 1 gr. per lb. body weight was of definite value in the treatment of distemper and respiratory infections such as bronchitis, tonsillitis, pharyngitis, rhinitis, and laryngitis. There were no toxic effects even

after 11 successive days of treatment. The literature is reviewed.—W. R. Bett.

Rostorfer, H. H. (1949.) **Comparison of methods for measurement of avian hemoglobin.**—*J. biol. Chem.* **180.** 901–911. [Author's summary copied *verbatim.*] **707**

Blood from normal immature and adult ducks, anemic adult ducks, and samples of hemoglobin solution have been analyzed for total iron, oxyhemoglobin, and acid and alkaline hematin.

Iron and oxyhemoglobin values were shown to vary consistently. Approximately 1·6 per cent of non-hemoglobin iron was found to be present.

A linear relationship was established for oxyhemoglobin and acid hematin at 410 mμ. The standard deviation from regression was 0·12 gm. per cent of hemoglobin, even when values from hemoglobin solutions were included in the data.

Two linear expressions were evident for oxyhemoglobin and acid hematin densities read at 450 mμ. One was for blood from immature and anemic birds and the other was for blood from adult birds and hemoglobin solutions from which most of the nucleoprotein had been removed.

The nucleoprotein of avian blood appears to interfere with acid hematin density (log I_0/I) at 450 mμ but does not do so appreciably at 410 mμ. The reasons for this are discussed.

There was only one linear expression for oxyhemoglobin and alkaline hematin at 450 mμ. The standard deviation from regression was less at 450 than at 400 mμ for alkaline hematin.

The manometric method appears to be the most accurate method for hemoglobin analyses of avian blood.

Sissons, H. A. (1949.) **Intermittent periosteal activity. [Correspondence.]**—*Nature, Lond.* **163.** 1001–1002. **708**

Zones of intermittent periosteal bone formation have been previously recorded as an after effect of repeated doses of therapeutic irradiation. Similar zones, developed as a result of the operation of factors other than irradiation, were found by S. in regions of recent periosteal bone formation, using the radiographical methods of Barclay. These zones are, however, formed (1) in the neighbourhood of primary bone sarcomas and (2) in bone in which there are lesions caused by a virus, avian osteopetrosis. In the former case, the periosteal bone was developed in about eight weeks. The occurrence of seven distinct zones in it indicates that the intermittent process of periosteal activity is repeated at intervals of about one week.—J. K. Gan.

Finestone, A. J., & Geschickter, C. F. (1949.) **Bone formation in the heart.**—*Amer. J. clin. Path.* **19.** 974–980. [Authors' summary slightly modified.] **709**

A case of massive calcification of the myocardium with bone formation is reported and the literature of the subject is reviewed.

The etiology of dystrophic calcification with particular reference to this change in the heart is discussed. Also the relationship of later ossification in these areas to increased vascularity is considered.

The authors consider that the mechanism in all dystrophic calcification and ossification, regardless of site is similar. This unusual finding in the myocardium is reported in order to emphasize the similarity of the process involved in all calcific changes in the heart, including the more common sites in the pericardium and aortic valve.

Ladell, W. S. S. (1949.) **Heat cramps.**—*Lancet.* **257.** 836–839. [Author's summary copied *verbatim.*] **710**

There is an analogy between heat cramp in man and water intoxication in animals. Both occur when there is intracellular overhydration. Heat cramp does not occur, however, unless at the same time the chloride content of the body fluid is diminished. This diminution need only be local.

There is some evidence that the suprarenal cortical hormone may protect against heat cramp.

Raggi, L., & Massaroni, A. (1947.) Sui derivati patologici dell'uraco negli animali domestici—cisti vera dell'uraco sede di flogosi fibrino purulenta in un vitello. **[Pathological outgrowth of the urachus in domestic animals. A true urachus cyst the seat of purulent fibrinous inflammation in a calf.]**—*Atti Soc. ital. Sci. vet.* **1.** 295–308. [English, French & German summaries. Abst. from English summary.] **711**

The embryonic development of the urachus and its conversion *post partum* into the umbilical ligament is discussed. The authors describe a preperitoneal, inflamed, purulent cyst of urachal origin in a bull calf six weeks old. The cyst was attached to the bladder.

Hypothetical explanations of the cause of the inflammation are given.—E. G.

POISONS AND POISONING

Parker, W. H., & Brooksbank, N. H. (1949.) **Suspected salt poisoning in pigs.**—*Vet. Rec.* **61.** 4–5. **712**

Salt poisoning occurred on two farms as a result of the use of camp waste in one case and bakehouse waste in the other. P.M. examination

on three of the pigs revealed a varying degree of inflammation of the small intestine. On analysis, the swill and the stomach contents for two pigs had a high sodium chloride content (0·94% NaCl expressed on a dry matter basis and 4·4% respectively).

It was afterwards found that damaged salt had accidentally been thrown in the pig bin from which the swill was obtained.—G. D. SHEARER.

CHIODI, H., & CARDEZA, A. F. (1949.) **Hepatic lesions produced by lead in rats fed a high fat diet.**—*Arch. Path.* **48.** 395–404. [Authors' summary copied *verbatim.*] **713**

Rats forcedly fed a diet containing 40 per cent fat were given daily 2 cc. of a 4·5 per cent lead acetate solution. Death followed within six to nineteen days and the livers showed cellular and nuclear hypertrophy, fatty infiltration or degeneration and necrosis. Addition of choline, inositol, tocopherol and brewers' yeast prevented fatty infiltration or degeneration in most of the animals, but not cellular and nuclear hypertrophy and necrosis.

Casein and, to a smaller degree, methionine prevented cellular and nuclear hypertrophy and necrosis of the liver when added to the high fat diet with lipotropic agents in the presence or the absence of yeast. Lead acetate given without an excess of fat did not produce conspicuous hepatic damage or the death of the rats within the experiment period. Casein prevented the death of the animals poisoned with lead and fed the high fat diet within the experimental period only when yeast was present in the diet. Possible mechanisms of the nuclear changes are discussed.

ROSENFELD, I., & BEATH, O. A. (1947.) **The influence of various substances on chronic selenium poisoning.**—*J. Pharmacol.* **91.** 218–223. **714**

Experiments on rats are described. Ascorbic acid in the food had no effect on the toxicity of selenium in the diet; daily doses of potassium iodide given intraperitoneally, increased the toxicity of both selenate and selenite selenium. Beet pectin given daily *per os* increased the life of the rats, but they relapsed two months after the withdrawal of the diet containing selenium and pectin.—MALCOLM WOODBINE.

DANOWSKI, T. S. (1949.) **Cancellation of fluoride inhibition of blood glucose catabolism.**—*Yale J. Biol. Med.* **22.** 31–38. [Author's summary copied *verbatim.*] **715**

The inhibition of glucose catabolism in defibrinated blood which follows the addition of sodium fluoride can be cancelled in part or entirely by the introduction of soluble salts of calcium or magnesium. The significance of these findings in the therapy of fluoride poisoning has been discussed.

NELSON, A. A., & WOODARD, G. (1949.) **Severe adrenal cortical atrophy (cytotoxic) and hepatic damage produced in dogs by feeding 2,2-bis (parachlorophenyl) - 1,1 - dichloroethane (DDD or TDE).**—*Arch. Path.* **48.** 387–394. [Authors' summary copied *verbatim.*] **716**

Ten dogs were studied grossly and microscopically after being fed the insecticide TDE (also called DDD; chemically, 2,2-bis [parachlorophenyl] -1,1-dichloroethane) at levels of 50 to 200, usually 50 or 80, mg. per kilogram per day for periods of one to thirty-three months. In every one there was a high grade of adrenal cortical atrophy of a cytotoxic type. The adrenal cortex was from one half to one third or less of its usual thickness, and microscopically there was much distortion of the normal structure with alteration of the normal cellular appearances. The adrenal medulla showed no changes.

Of some dozens of compounds fed to over 300 of our dogs, none except TDE has caused adrenal cortical atrophy, even though several have caused severe hepatic damage; few have affected the adrenal gland in any way, even though they differed chemically from TDE as little as the presence of a single additional chlorine atom in the molecule.

In other animal species studied by ourselves and others TDE caused little if any adrenal damage.

Males and females, purebred and mongrel dogs, were affected alike. In addition to the adrenal gland the liver was uniformly affected, the principal lesion being fatty degeneration. The kidneys contained a greater than usual amount of fat. Among other structures the hypophysis, the testis or the ovary, the pancreas, the thyroid gland and the parathyroid gland of every one of the 10 dogs were examined, and none of these structures showed any effect attributable to TDE.

Morphologically, the condition in the adrenal gland of the dog has considerable resemblance to that observed in the adrenal gland of man in some instances of Addison's disease of the idiopathic or cytotoxic type, but we are not stressing either the morphologic resemblance or any idea of a specific chemical cause of the latter. The effect of TDE on the dog adrenal gland is, however, a striking example of chemical specificity in the causation of organic damage.

DECOURT, P., DUPOUX, R., & PELLOUX, A. (1949.) Sur la toxicité des parasiticides et des molluscocides pour les vertébrés et les coefficients de sécurité nécessaires à leur emploi. [**The toxicity of parasiticides and molluscicides for**

vertebrate animals and the measures necessary to avoid injury.]—*Bull. Soc. Path. exot.* **42.** 33–38. **717**

In choosing parasiticides and molluscicides it is necessary to ensure an adequate margin between the toxicity for the higher vertebrates and the parasites to be killed. Methods adopted in the field application of parasiticides are considered and the consequent danger to man and domestic animals. In comparing the toxicity of various substances it is suggested that a satisfactory standard is the amount of the drug which, if consumed in the drinking water during the course of the day, would cause the death of the host. This is described as the " unit of toxicity ". On the other hand, the " coefficient of security " is defined as the number of l. or of kg. containing a unit of toxicity at the concentration used, multiplied by a variable coefficient deduced from the method of application of the drug.—S. B. K.

GELFAND, M. (1949.) **Paraffin pneumonia.**—*Brit. med. J.* Nov. 19th. 1151–1152. **718**

Poisoning of young children by accidental swallowing of paraffin (kerosene) is not uncommon in Southern Rhodesia where paraffin oil lamps are used for lighting huts. A number of cases which were brought to hospital and treated by gastric lavage are described. The symptoms are those of an acute bronchitis or pneumonia.

It was difficult to decide whether lung lesions were caused by aspiration of the liquid or by its absorption from the stomach. There is a useful list of references.

[Poisoning of cattle by crude petroleum has been reported ; in cattle the chances of aspiration of the volatile constituents during eructation of gases from the rumen would be greater.]—M. C.

GIBSON, E. A., & LINZELL, J. L. (1948.) **Diesel oil poisoning in cattle.**—*Vet. Rec.* **60.** 60–61. **719**

Of eight cows that drank water which contained diesel oil, six became ill and three died. The chief findings P.M. were pneumonia, probably due to aspiration of the oil, and congestion of the mammary gland, probably caused by excretion of the irritant material by the udder.—R. MARSHALL.

CONNOLLY, F. (1949.) **Laburnum poisoning in cattle.**—*Irish Vet. J.* **3.** 266–268. **720**

Two occurrences of laburnum poisoning, both in December when the tree was leafless, are described. Of 12 cattle involved one died within two days, but the others given symptomatic treatment recovered after a few days. The second occurrence concerned two of four bullocks and these animals apparently recovered. Some details of the effects on the cases seen are recorded.

—J. R. PICKFORD.

MCCALLUM, A. M., & BLAXLAND, J. D. (1949.) **A case of suspected poisoning of geese, possibly caused by the feeding of wet brewers' grains.**—*Vet. Rec.* **61.** 204. **721**

Of 70 geese on a diet containing canteen swill, crushed oats and wet brewers' grains, 60 had symptoms of poisoning and over 30 died. In some cases P.M. examination revealed haemorrhagic enteritis. It is suggested that in the fermentation of the brewers' grains, possibly after storage, toxic products may have been developed.—J. R. P.

MONAHAN, E. P., & LALANNE, G. G. (1949.) **Metabolism of dogs during intoxication from agenized white wheat flour.**—*Amer. J. Physiol.* **159.** 298–302. [Authors' summary copied *verbatim*.] **722**

The metabolism of 6 dogs was studied intensively to determine what, if any, changes occur in conjunction with intoxication from the ingestion of agenized white wheat flour. There was a large increase in serum acetylcholine and a striking decrease in serum cholinesterase activity during intoxication. These changes were progressive, being greatest toward the end of the period of intoxication. No impairment of kidney or liver function could be detected at any time, as judged by widely used clinical and laboratory criteria.

No consistent or biologically significant changes during the course of intoxication were detected in erythrocyte count, leukocyte count, blood hemoglobin, hematocrit, blood glucose, serum non-protein nitrogen, serum total protein, serum albumin, serum globulin, serum A/G ratio, serum urea nitrogen, serum inorganic phosphorus, serum calcium, urinary total nitrogen, urinary urea nitrogen, urinary creatinine, urinary calcium or urinary phosphorus.

THÉODORIDÈS, J. (1949.) Les coléoptères nuisibles aux animaux domestiques. [**Coleoptera harmful to domestic animals.**]—*Ann. Parasit. hum. comp.* **24.** 116–123. **723**

The literature dealing with noxious effects caused by beetles is reviewed. Among the examples cited are the following :– Local irritation of the nasal and buccal mucous membranes in horses, asses and cows caused by *Blaps mortisaga* infesting straw used as litter ; vomiting, dysuria, haematuria and dysentery in dogs in Indo-China as a result of eating the flesh of birds which had fed on cantharides beetles ; poisoning of fowls in the U.S.A. by eating *Macrodactylus subspinosus*. There is a useful table listing those species which have been incriminated, the domestic animals affected, the nature of the lesions produced and the localities in which such incidents have occurred.—M. C.

PHARMACOLOGY AND GENERAL THERAPEUTICS

(For treatment of specific infections see under the appropriate disease)

SMITH, J. A., & ZALMAN, S. (1949.) **Some effects of large doses of ergot products on rats.** —*Proc. Soc. exp. Biol., N.Y.* **72.** 13–15. [Authors' summary copied *verbatim.*] **724**

The effect of several dihydrogenated derivatives of ergot were studied on rate of growth, production of gangrene and survival, as compared with ergotamine tartrate. None of these materials inhibited growth consistently; none inhibited growth as much as ergotamine tartrate. None of the dihydrogenated derivatives caused gangrene; in contrast, ergotamine produced gangrene in 80 of the rats. The survival of rats receiving ergot alkaloids or dihydrogenated ergot derivatives was equal to or better than that of the controls.

SAVOLAINEN, T. (1948.) **Studies on the growth-inhibition of certain anaerobic bacterial strains by organic compounds.**—*Ann. Med. Exper. et Biol. Fenniae.* **26.** Suppl. 177. [Abst. in *Bull. Hyg., Lond.* **23.** 733. (1948), copied *verbatim.* Signed: L. P. GARROD.] **725**

This monograph begins with a chronological review of the literature of bacteriostasis by chemical agents, with special reference to anaerobes. The object of the author's own work was to determine what compounds inhibit the growth of anaerobic bacteria, and to compare their effect on anaerobes with that on aerobes. Among the former, almost all the species studied were of the genus *Clostridium*: the aerobes included representatives of many genera. The work falls into two parts, in the first of which no less than 1,300 compounds in great variety were tested by a somewhat crude method, " a small quantity, or in the case of fluids a small droplet ", being placed on the surface of a pre-inoculated plate of glucose blood agar, six or seven substances being tested on each plate: the form of anaerobiosis used was a vacuum.

In the second part of the study, 26 compounds were tested by a quantitative method, the substance being incorporated in the medium in a series of different concentrations, against 21 aerobic species and 23 anaerobes of 14 species. The results are presented in a series of tables in which the relative degrees of activity against aerobes and anaerobes can be seen at a glance. Some substances, of which examples are phenol and thymol, are equally active against both groups: others, notably trinitrophenol, *p*-nitrobenzyl chloride, potassium chlorate, marfanil, and iodoform, are much more active against anaerobes than against aerobes. There is no example of the opposite effect.

This survey covers a very wide field, and the mass of information obtained, although not all accurately quantitative, may be helpful in indicating the approximate antibacterial activity of many compounds not mentioned in previous publications.

MIGAKI, H., & MCCULLOCH, E. C. (1949.) **Survivor curves of bacteria exposed to surface-active agents.**—*J. Bact.* **58.** 161–169. [Authors' summary copied *verbatim.*] **726**

The factors involved in the production, using plate count methods, of the unusual survivor curves observed with bacterial populations exposed to various surface-active agents have been investigated. It is postulated that the survivor curves observed in the studies are a resultant, not only of direct chemical disinfection, but of certain physical effects exerted by these compounds and do not provide a true index to the rate of death.

SCHEIDY, S. F., & TILLSON, E. K. (1947.) **Concentration of sulfadiazine, sulfamerazine and sulfamethazine in the blood of cattle.**—*Vet. Med.* **42.** 252–254. **727**

The experiments were designed to compare the concentrations of free sulphonamide in the plasma of normal cattle after the administration of comparable single, intravenous or oral, doses of one of the three compounds.

Twelve heifer calves 7–10 months old, weighing from 280–465 lb. were given intravenous doses of 70 mg. per kg., as a 6–10% solution, or 140 mg. per kg. as a drench in 0·5% gum tragacanth.

With sodium sulphadiazine there was a fall from a maximum of 14·6 mg. per 100 ml. after one hour to 1·3 mg. per 100 ml. plasma after 24 hours. For sodium sulphamerazine the comparable figures were 15·3 to 2·5 mg. and for sodium sulphamethazine 17·0 to 5·1 mg. After drenching the rate and degree of absorption from the digestive tract was also greater for sulphamethazine and sulphamerazine than for sulphadiazine.—MALCOLM WOODBINE.

ANON. (1949.) **Symposium on antibiotics.**—*J. clin. Invest.* **28.** 821–1055. **728**

This number of the *Journal of Clinical Investigation* is devoted to papers presented at the Second National Symposium on Recent Advances in Biotics Research. It contains forty papers.

HIRSCH, A., & MATTICK, A. T. R. (1949.) **Some recent applications of nisin.**—*Lancet.* **257.** 190–193. [Authors' summary copied *verbatim.*] **729**

Nisin [an antibiotic isolated from streptococci] is bactericidal in vitro and in vivo. It seems to have no effect on blood, but its toxicity depends on the route of infection. Severe local reaction on

repeated subcutaneous injection is obtained. Intravenously and intramuscularly there is rapid absorption with little or no local reaction, and the approximate LD50 is 30 mg. per kg. with intravenous injection and 200 mg. per kg. with intramuscular injection [in rabbits.—Ed. *V. B.*].

The H37RV strains of *Myco. tuberculosis* which are resistant to nisin are susceptible to streptomycin and vice versa. More than additive effect against H37RV is obtained where nisin is used with streptomycin and licheniformin [a compound derived from lichinin a carbohydrate and hexamine], or with licheniformin and sulphathiazole.

Given subcutaneously nisin limited the spread of experimental tuberculosis. Given intravenously it almost completely suppressed its development.

REESE, E., SANDERSON, K., WOODWARD, R., & EISENBERG, G. M. (1949.) **Variation and mutation in penicillium chrysogenum, Wis. Q176.**—*J. Bact.* **57.** 15–21. [Authors' summary copied *verbatim*.] **730**

Several mutants of *Penicillium chrysogenum*, Wis. Q176, have been produced which in shaker tests surpass the parent in yields of penicillin by at least 50 per cent. Ultraviolet irradiation resulted in the production of greater numbers of variants than did N-mustard treatment. *P. chrysogenum*, Wis Q176, can be maintained by serial weekly transfers on agar slants without loss in penicillin-producing capacity.

PRATT, R., & DUFRENOY, J. (1949.) **Cytochemical mechanisms of penicillin action. VIII. Involvement of ribonucleic acid derivatives.**—*J. Bact.* **57.** 9–13. Authors' summary copied *verbatim*.] **731**

Double staining of penicillin assay plates with triphenyltetrazolium chloride and with trypan blue provides further evidence to support the conclusion that the inhibition of enzyme systems involved in H transfer and in the dephosphorylation of complex ribonucleates is fundamentally involved in the action of penicillin on gram-positive organisms.

The use of the same techniques suggests that the action of polymyxin on the gram-negative *Escherichia coli* is effected through essentially similar mechanisms.

EAGLE, H., FLEISCHMAN, R., & MUSSELMAN, A. D. (1949.) **The serum concentration of penicillin G in mice, rabbits and men after its intramuscular injection in aqueous solution.**—*J. Bact.* **57.** 119–126. [Authors' summary copied *verbatim*.] **732**

Data are given for the median serum concentrations of penicillin G after its intramuscular injection in aqueous solution in men, rabbits, and mice at doses of 0·6, 1 (1·5), 3, 10, 60, and 200 mg per kg. For equal doses of penicillin the serum levels at a given time were in the order man > rabbit > mouse.

The initial (15- to 30-minute) level in man was 3 to 5 times greater than it was in mice or rabbits, indicative of a significant species difference in the initial distribution of the drug in the body fluids. Thereafter, penicillin disappeared from the serum of rabbits at the rate of 65 per cent an hour, and somewhat faster in man. In mice, however, it fell off at a much faster initial rate, varying between 91 and 99 per cent an hour. In consequence of these differences in the initial distribution of penicillin and its subsequent rate of disappearance from the serum, the time for which a given dosage of penicillin provided a measurable serum concentration was in the order $1 : 3 : 4\frac{1}{2}$ in mouse, rabbit, and man, respectively. To prolong a given serum level by 1 hour would require approximately a 2-fold increase in dosage in man, a 3-fold increase in rabbit, but a 5- to 20-fold increase in mice.

REDFEARN, J. W. T., ELITHORN, A., TILL, K., & IBBOTT, F. A. (1949.) **Penicillin in the cerebrospinal fluid.**—*Lancet.* **257.** 652–657. [Authors' summary and conclusions copied *verbatim*.] **733**

The reliability of a serial-dilution method for the assay of penicillin in the C.S.F. was investigated.

The method was used to assay 152 samples of C.S.F. from 111 patients, who included a group of cases of parenchymatous neurosyphilis. The samples were obtained by ventricular, cisternal, and lumbar puncture, usually four hours after a dose of 0·5 mega-unit of penicillin. A single intramuscular dose of 0·5 mega-unit produced a bactericidal C.S.F.-penicillin level in 70% of the patients. After such doses penicillin appeared in the C.S.F. of persons with no demonstrable intracranial disease. Penicillin was found in the C.S.F. of one patient fifty minutes after intramuscular injection. Four hours after injection penicillin is probably distributed fairly evenly throughout the C.S.F.

Those diseases which cause excess protein to appear in the C.S.F. also cause greater permeability of the blood-C.S.F. barrier to penicillin. High concentrations of penicillin were found in three cerebral gliomatous cysts. Thus penicillin apparently penetrates much more readily tissue whose vascular structure is damaged than it does normal tissue. Barrier permeability tends to be higher in the elderly. High or low C.S.F. pressure does not seem to effect permeability. If a limited amount of penicillin is to be used, large well-

spaced doses are probably more effective than small frequent doses for achieving high C.S.F.-penicillin levels.

BERGER, J. (1949.) **The use of B-naphthoxyethanol ("Anavenol") in practice.**—*Vet. Rec.* **61.** 814–815. [Abst. from author's summary and conclusions.] **734**

Sixteen cases of short surgical interferences in the horse under "Anavenol" anaesthesia are recorded. No unsatisfactory sequelae were observed in these cases and in eight other anaesthesias not recorded. Satisfactory anaesthesia was obtained in the majority of cases at a dosage level of 0·028 to 0·044 grammes per kg. Some observations are made on restraint, with special reference to castration. It is easily administered and the patient recovers quickly.

BRAIN, P. G. P. (1949.) **Some observations on the technique of paravertebral anaesthesia.**—*Vet. Rec.* **61.** 88. **735**

The anterior border of the first lumbar transverse process was used as the site for injection of the last thoracic nerve, and the injection was made anterior to and below this. B. finds the posterior border of the transverse process of the corresponding vertebra to be a better guide and to support his contention gives a diagram drawn from a dissection. In all cases the injection is made at a point 2 in. from the midline.—E. J. H. F.

GILYAROVSKY, V. A., SLUCHEVSKY, I. F., LIVENTSEV, N. M., & KIRILLOVA, Z. A. (1948.) **Electronarcosis.**—*Klin. Med., Mosk.* **26.** No. 6. pp. 18–23. [Copied *verbatim* from abst. in *Brit. Abstr.* AIII. June. p. 704 of absts. (1949). Signed: S. S. B. GILDER.] **736**

The authors studied in dogs and human subjects the production of anaesthesia with electric currents. The electronarcosis employed differs from electric convulsion therapy in that there is no stage of excitation, no danger to the patient, and no change in the autonomic nervous system. A special apparatus was constructed by which an interrupted galvanic current (Leduc) is passed through bitemporal electrodes. Over 200 experiments were carried out on dogs, the longest period of anaesthesia induced being 27 hours. On stopping the current, recovery is instantaneous and there are no after-effects. During the stage of unconsciousness, there is complete analgesia, muscular hypotonus, and absence of response to stimuli. On two dogs, laparotomy was carried out without difficulty or post-operative complications. Three phases may be recognised: (1) a stage of lethargy and analgesia without loss of consciousness; (2) a stage of light sleep with amnesia afterwards; (3) a stage of deep sleep with muscle relaxation. An appendicectomy was performed with this anaesthetic technique, the operation lasting for 18 min. and the anaesthesia for 25 min. Pulse- and respiration-rates rose only for the first 5 min. Recovery from anaesthesia was instantaneous. Muscle relaxation was perfect. There were no post-operative complications. This study is still in the experimental stage, but may have wide clinical applications.

YEOMANS, A. H., ROGERS, E. E., & BALL, W. H. (1949.) **Deposition of aerosol particles.**—*J. econ. Ent.* **42.** 591–596. [Authors' summary copied *verbatim*.] **737**

The deposit of aerosol particles on various surfaces was measured in still air and moving air, to follow up studies in which the deposition on mosquitoes had been determined from the resulting mortality. In still air the particles tended to settle straight down, unless deviated by some force greater than gravity. In general there are usually some air currents that interfere with the particles settling straight down. Even when deviation occurred, practically all deposition was on horizontal surfaces, or upon horizontal protrusions from vertical surfaces. These results were determined from mortality of insects confined on surfaces that were previously exposed to aerosols in vertical and horizontal positions, by chemical analyses of DDT on vertical and horizontal slides, by visual observation of deposits of a dye incorporated in the aerosol solution, and by measuring and counting particles deposited on vertical and horizontal slides.

The optimum particle size to use on insects was found to increase with the size of the insect. The optimum diameter for mosquitoes was 15·81 microns as compared with 22·4 microns for house flies.

The deposition on discs of wire cloth, glass, filter paper, and leaves exposed to aerosol clouds moving at 2 to 16 m.p.h. was measured. These deposits agreed well with the deposit predicted by a formula developed by Sell.

It was found that the smaller particles tended to deposit on the backs of the discs and the larger ones on the front. This division occurred at a particle diameter of about 15 microns at 8 m.p.h., as determined by the relative amount of deposit on each side. At 16 m.p.h. the division point was slightly higher.

LESTER, W., Jr., ROBERTSON, O. H., PUCK, T. T., & WISE, H. (1949.) **The rate of bactericidal action of triethylene glycol vapor on microorganisms dispersed into the air in small droplets.**—*Amer. J. Hyg.* **50.** 175–188. [Authors' summary copied *verbatim*.] **738**

A study was made of the rate at which freshly atomized bacteria are killed by triethylene

glycol vapor under varying conditions of atmospheric humidity and per cent saturation of the air with glycol vapor. By means of specially constructed experimental rooms and the glycostat it was possible to maintain the temperature, relative humidity and the degree of glycol vapor saturation at any desired value. The microorganism principally studied was *Streptococcus hemolyticus*, group C. Pneumococcus type 1 and *Staphylococcus albus* were also employed. Determinations of the bacterial content of the air were made by means of the bubbler sampler and blood-agar settling plates. The bacterial counts per cubic foot of air or per settling plate were plotted on semi-logarithmic paper and fell on a straight line. The rate of kill, K, was calculated from an equation employing the logarithms of the numbers of bacteria in samples taken at successive time intervals.

It was found that under optimum conditions (15 to 40 per cent relative humidity and 40 to 100 per cent saturation of glycol vapor at room temperature) bactericidal action was very rapid. Eighty to 90 per cent of the bacteria were killed within the first minute or two of exposure and by 3 or 4 minutes the air samples were essentially sterile. The rate of kill at any relative humidity between 5 per cent and 55 per cent rose progressively with increasing per cent saturation of glycol vapor. As the relative humidity was increased beyond 50 per cent a rapid diminution in the rate of bacterial killing occurred with any given per cent saturation of glycol vapor. At 60 per cent relative humidity the rate of kill was one-fifth to one-sixth that of the optimum occurring at lower humidities. These data are presented in the form of a nomogram.

Comparison of results of collection of bacteria by bubbler samplers and settling plates brought out the finding that the glycol effect on the larger bacterial droplets, selected particularly by the settling plates, is inhibited at relative humidities of 60 per cent or above, while the bacteria in smaller particles, captured in the bubblers, are still susceptible to the lethal effect of the glycol at relative humidities up to 80 per cent but killing proceeds at a much reduced rate.

See also absts. **553** (penicillin resistance); **555-556** (penicillin in mastitis); **562** (respiratory TB.); **564** (streptomycin in meningitis); **565** (avian TB.); **566** (experimental TB.); **567** (neomycin); **568** (antihistamine in TB.); **569** (phenylalanine in TB.); **570** (riboflavin); **571** (murine leprosy); **584** (streptomycin); **585-586** (brucellosis); **591** (fungus inhibitors); **596** (protozoa); **602** (blackhead); **603** (coccidiosis); **605** (*Eimeria* infection); **612** (paludrine); **630** (virus diseases); **645** (hard pad disease); **664-665** (antihistamines); **667-669** and **671** (insecticides); **674-676** and **678** (anthelmintics); **823** (textbook, medicine).

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

KAPELLER-ADLER, R. (1949.) **Histamine metabolism in pregnancy.**—*Lancet.* **257.** 745–747. [Author's summary copied *verbatim.*] **739**

The histamine content was separately estimated in the plasma and in the blood-cells of pregnant women in various stages and conditions of pregnancy. Histaminase activity was simultaneously determined in the serum of these women by a modification of the indigo-disulphonate reaction of Zeller et al. (1941b).

Strong histaminase activity was found in the serum of all the pregnant women. Histamine was present in the blood-cells in amounts comparable with those found in the blood of non-pregnant women. It was hardly detectable in the plasma. In mild toxaemia of pregnancy the histaminase activity did not differ much from that in normal pregnancy. Higher values, however, than in normal pregnancy were obtained for plasma-histamine. In severe toxaemia of pregnancy the histaminase activity was distinctly decreased. The histamine level in the blood-cells was remarkably low, being in many cases exceeded by the level in the plasma, which was high. Considerable amounts of histamine were found in the plasma of women in labour. Histaminase activity seemed to decline in the later stages of labour.

MACINTOSH, F. C., & PATON, W. D. M. (1949.) **The liberation of histamine by certain organic bases.**—*J. Physiol.* **109.** 190–219. [Authors' summary copied *verbatim.*] **740**

Many organic bases have the property, when given by vein to the cat, of producing a sudden fall of arterial pressure, the beginning of which is delayed for some 20–25 sec. after the injection. Blood or plasma obtained during the period of lowered blood pressure contains a depressor substance whose action is manifested within a few seconds after injection. This substance has been identified pharmacologically as histamine, and it is released in amounts sufficient to account for the vascular effects of the bases which liberate it. Among the bases found to liberate histamine were diamines, diamidines, diguanidines, diisothioureas, diquaternaries, some benzamidine derivatives, and licheniformin, an antibiotic polypeptide. Such compounds elicit a typical triple response when injected into human skin. When continuously infused by vein into a cat they evoke a secretion of gastric juice.

In the dog these compounds likewise lower the blood pressure by releasing histamine in large amounts, and in addition they decrease or abolish the coagulability of the blood. The latter effect appears to be due to the liberation of heparin. The liver is the main site of histamine release in the dog. In the cat, the main sites of the release are skin and muscle, and the liver is not involved.

The vascular effects of histamine liberators are reduced but usually not prevented by antihistamine drugs. A variety of substances, including heparin, calcium salts and alkalis, also reduce these effects, apparently by interfering with the histamine release. Possible mechanisms for the release of histamine by such compounds are considered, with particular reference to the similarity of their effects to the phenomena of anaphylaxis and peptone shock.

McDougall, E. I. (1948.) **Studies on ruminant saliva. I. The composition and output of sheep's saliva.**—*Biochem. J.* **43.** 99–109. [Author's summary copied *verbatim.*] **741**

The composition of the mixed and parotid salivary secretions of the sheep has been studied.

The dry matter, 1·0–1·4 g./100 ml., of both fluids was mainly inorganic but contained small amounts of nitrogen, 9–36 mg./100 ml. The mixed secretion usually appeared to consist largely of parotid saliva. The concentrations of total salts in the latter, 180 m-equiv./l., and of the principal cations, sodium and potassium, were similar to those occurring in serum. The concentrations of the anions, of bicarbonate, and of phosphate and chloride, were approximately four times, fifteen times and one-sixth respectively as much as those obtained in the serum. The carbon dioxide content of the parotid saliva, mixed secretion and rumen liquor was found to be 233, 25–200 and 40–170 ml./100 ml., respectively. The parotid saliva had an average pH of 8·2 and was calculated to be actually secreted with a pH of 8·1.

The amount of saliva formed by a single parotid gland ranged from 930 to 1840 ml. in 24 hr.

Liebow, A. A., Warren, S., & DeCoursey, E. (1949.) **Pathology of atomic bomb casualties.** —*Amer. J. Path.* **25.** 853–940. [Authors' summary and conclusions copied *verbatim.*] **742**

The explosion of the atomic bomb produced mechanical, thermal, and ionizing radiation injuries. The last were quantitatively the least important in the production of casualties.

Direct blast injuries analogous to those inflicted by high explosives were almost unknown among survivors, as indicated by an incidence of ruptured eardrums of about 1 per cent. Almost universal, however, was damage produced by flying glass and the falling beams of wooden houses. The more severe injuries were rare since those that had been severely hurt were killed by fires that swept the city before rescue operations could be instituted.

The burns among survivors were largely of the "flash" type, the result of an exceedingly large quantity of radiant heat acting for an exceedingly brief interval. The effects of exposure extended to approximately 4000 yds. from the bomb. Only survivors in the direct path of the rectilinear rays were involved, so that the burns were of a sharply outlined "profile" or "mask" type. Depigmentation at the center with marginal hyper-pigmentation of the burns was prominent in patients close to the bomb, but at greater distances the entire exposed surface became intensely pigmented, and the pigment showed no tendency to fade within 4 months. There was histologic evidence that depigmentation occurred without destruction of the squamous epithelium of the surface, suggesting the action of specific wavelengths.

Even minor injuries and burns became serious foci of infection in persons who also suffered the leukopenia resulting from radiation.

The effects of ionizing radiations resembled closely those produced by total body x-irradiation of animals and men. A special effort was made to center the study of the lesions in patients who had sustained little or no other injury. The effects of ionizing radiations were observed in varying degrees of severity in poorly shielded patients who had been within approximately a mile from the bomb.

Nausea and vomiting occurred in many adequately exposed persons within a few hours after the bomb. The earliest autopsy material was from persons dying "mysteriously" with symptoms of severe diarrhea and fever on the third day after the bomb. In them, epilation and purpura had not had time to appear. After the end of the second week, however, these signs became manifest, and the infective complications of an aplastic anemia became increasingly prominent. Leukopenia had been observed within the first few days after the bombing. After the sixth week, the bone marrow tended to recover and the mortality declined sharply, although an occasional patient succumbed to organizing pneumonitis or ulcerative enteritis. At necropsy, changes were found in the skin, gastro-intestinal tract, gonads, and hemopoietic tissues.

The Skin

In a few cases there were suggestive epithelial changes at the margins of ulcerative lesions in patients dying in the third week, but since most persons who received more than an erythema dose over the whole body died during the first confused days when autopsies were extremely rare, little material was available for study. Epilation in both men and women usually began 14 to 20 days after the bomb. It involved chiefly the scalp in a distribution resembling that of ordinary baldness. Histologically, the mechanism appeared to be

entirely analogous to that of the usual processes of loss and replacement of the hair, arrest of mitosis in the matrix, failure of differentiation of the internal root sheath with extrusion of old hair, and finally (some 2 months after irradiation) renewed differentiation of the internal root sheath with penetration of the new hair through the old external sheath to the surface.

Gastro-intestinal Tract

Typical radiation changes were seen in the intestines of persons dying as early as the fourth day. These consisted of the appearance of bizarre cells, some with enormous nuclei possessing a coarse chromatin network and a large body of cytoplasm. Some cells were found in atypical mitosis and tripolar mitotic figures were observed. In one patient who died on the tenth day, the cytoplasm and nuclei of the squamous epithelial cells of the pharynx and tongue were remarkably swollen, and fragmentation of the nuclei was observed.

Gonads

Even at the fourth day remarkable changes were found in the testes, with detachment of the germinal epithelium together with an increase in Sertoli cells. Towards the end of the first month, there was almost complete loss of germinal epithelium. After the fifth week the tubules began to display thickening of the basement membrane and there were hyaline deposits restricting the lumina of the interstitial blood vessels. There was questionable hyperplasia of the interstitial tissue after the end of the sixth week. Clinically, there was a remarkable decrease in the count of spermatozoa of patients who had been close to the bomb. How permanent this will be is at present unknown. " Castration cells " were found occasionally in the pituitary body. Much less striking changes were observed in the ovary. A few primary follicles were in process of atresia. The most usual finding was that of the absence of developing follicles despite the persistence of primary follicles. The endometrium showed an absence of corpus luteum effect.

Lymphoid Tissues

When first seen, after 8 days, there was a remarkable degree of atrophy of the lymphoid tissues, including those of the spleen, leaving nothing but the reticular skeleton. Beginning on the fifth day, however, large numbers of atypical mononuclear cells resembling lymphoblasts or Reed-Sternberg cells began to appear. These gradually decreased in number during the following 8 months and in a few instances secondary follicles had reappeared by the end of this time both in the spleen and lymph nodes.

Bone Marrow

Even within the first week, in heavily irradiated individuals, almost all mature myeloid and erythroid tissue had disappeared, but there already was evidence of proliferative activity on the part of the reticulum cells. During the first month such proliferative activity became remarkable in many cases, but the products were largely atypical reticulum cells and plasma cells. In some patients, after various lengths of time, there was renewed differentiation into granulopoietic and erythropoietic tissue, and in some, who died toward the end of the sixth week, actual hyperplasia of this tissue was observed, although peripheral leukopenia had been noted.

After the sixth week more and more bone marrows tended to show hyperplasia of myeloid cells and the incidence of leukopenia decreased. In all of these marrows, however, considerable numbers of reticulum cells, plasma cells, and lymphocytes persisted in increased numbers. As the marrow recovered, polymorphonuclear leukocytes became numerous in the lesions and hemorrhage ceased to be an important factor. The important lesions at necropsy at this time were either a necrotizing pneumonia, sometimes in process of organization, or an ulcerative enteritis. Thrombocytopenia was at its lowest level at about the third to fourth week. Thereafter there was rapid recovery. Anemia also was severe during the third to fifth weeks in many patients, but in others it gradually reached its lowest levels thereafter. Recovery in these people was sluggish. This has been associated with dietary deficiency as well as with the effects of the ionizing radiation and of the infections that followed.

No defense has as yet been developed against the destructive effects upon cells subjected to massive amounts of ionizing radiations. Hope for success in treatment lies in the remarkable resistance of the reticulum cell and the tendency of the marrow ultimately to recover. Pending the resurrection of the marrow, the main therapeutic problems are those of hemorrhage and infection. Despite recent advances, new and more efficient methods for meeting this double challenge remain to be discovered.

Among the many problems that are still to be investigated among the populations of Hiroshima and Nagasaki are: (1) Whether permanent damage of such nature as to reduce the life span was inflicted upon survivors who have apparently recovered. (2) Whether there will be an increased incidence of neoplasia (including leukemia) among the burned or irradiated patients. (3) Whether the growth of irradiated children has been impaired. (4) Whether permanent sterility was induced in any group of survivors. (5) Whether

genetic changes will appear, as indicated by decreased fertility, or demonstrable anatomic or physiologic changes. These problems will require many years, or even generations for their solution, if they can be solved at all.

TULLIS, J. L. (1949.) **The response of tissue to total body irradiation.**—*Amer. J. Path.* **25.** 829–851. [Author's summary and conclusions copied *verbatim.*] **743**

The lesions produced in swine by exposure of the total body to ionizing radiations from an atomic bomb explosion are indistinguishable from lesions produced by exposure of the total body to million volt X-irradiation. These lesions are characterized by hemorrhage, necrosis, and secondary infections.

Lymphoid cells, myeloblasts, erythroblasts, germ cells, and intestinal epithelium are found to be particularly radiosensitive. Injury to these cells causes anemia and lowering of resistance to infection.

Irradiation causes dilatation of capillaries, impairment of circulation, and tissue anoxia. Anemia enhances both lowered resistance to infection and anoxia, and thus the pathologic state becomes self-perpetuating.

Absorption of toxic substances through injured intestinal mucosa and the accumulation of products of tissue destruction in the blood stream are phenomena which logically might follow the widespread necrosis that occurs after total body irradiation. There is, however, no chemical proof or histologic evidence of toxemia from either of these sources.

Since the most primitive hematopoietic stem cells—the reticular cells—are relatively radioresistant, the effort to reduce mortality does not seem altogether hopeless. Management of total body radiation disease should be directed at prevention of secondary infections and treatment of anemia, impaired circulation, and anoxia.

LADD, M., & RAISZ, L. G. (1949.) **Response of the normal dog to dietary sodium chloride.**—*Amer. J. Physiol.* **159.** 149–152. [Authors' summary and conclusions copied *verbatim.*] **744**

The oral administration to the dog of large quantities of salt (up to 4 gm/kg.) in association with the diet induces rapid and marked increases (up to 100%) in glomerular filtration and effective renal plasma flow, and the rapid excretion of salt (at rates in excess of 1 m Eq/min.). Renal function may be slightly increased 24 hours later, but it invariably returns to normal by the third day of a continuing high salt diet. The renal excretion of salt by the dog is so efficient that intakes up to 4 gm/kg/day may be maintained for considerable periods (6 days) without increase in body weight or elevation of plasma sodium or chloride concentration, showing that there is no significant salt retention. This is in sharp contrast to man, where a moderate increase in salt intake (less than 0·5 gm/kg.) leads to significant retention of salt and water. Because of this difference between the two species it is hazardous to attempt to explain salt excretion in man solely by the physiological responses observed in the dog. The sustained elevation in renal function in the dog associated with a high protein diet is probably unrelated to any concurrent elevation in salt intake.

NEWLAND, H. W., MCMILLEN, W. N., THORP, F., Jr., & REINEKE, E. P. (1949.) **Further studies on temperature adaptation in baby pigs.**—*J. Anim. Sci.* **8.** 643. [Only abst. given, copied *verbatim.*] **745**

In continuation of the work reported last year, sows were farrowed under two conditions of environmental temperature; one room at 60° to 70°F., the other at 25° to 30°F. During the first half hour after birth the average drop in body temperature of the pigs born in the warm environment was 3·0°, as compared to an average drop of 8·8° for pigs born in the cold. In 48 hours the pigs in the warm room had reached an almost normal body temperature of 102·0°F., while those in the cold environment averaged only 100·7°F. in the same length of time. Body temperature drop was inversely proportional to birth weight, smaller pigs dropping lower and returning to normal at a slower rate. The blood picture on pigs two to four days old, chilled at 34°F. for three hours, showed a definite drop in blood hematocrit. On 15 pigs the average hematocrit drop was 33·6% to 26·8%. For two and three week old pigs chilled at the same temperature, the average hematocrit drop was only 0·6% and 1·2% respectively.

ROHDE, G. (1948.) **Difference in mineral content of male and female living organisms [plant and animal].**—*Z. PflErnähr. Düng.* **41.** 132–147. [Abst. in *Brit. Abstr.* AIII. June. p. 731 of absts. (1949), slightly modified. Signed: T. W. GOODWIN.] **746**

A literature review leads to the conclusions that in male organisms Fe, Mg, K, Cu, Al, Cl, and I, occur in larger and more active amounts than in females; that Mn, Ca, S, N, Zn, B, Na, and SiO_2 have a greater action on females than on males; and that in males the minerals accumulate in the cell nuclei whilst in females they accumulate in the protoplasm and the cell wall.

CRAM, D. M., & ROSSITER, R. J. (1949.) **Phosphatase of rabbit polymorphonuclear leucocytes.**—*Canad. J. Res.* Sect. E. **27.** 290–307. [Authors' abst. copied *verbatim.*] **747**

Rabbit polymorphonuclear leucocytes contain an active phosphatase that readily hydrolyzes disodium phenyl phosphate. The pH activity curve of the enzyme was found to have two maxima, one in the region of pH 10 and the other in the region of pH 5. The alkaline phosphatase was much more active than the acid phosphatase. The concentration of alkaline phosphatase in rabbit white cells was approximately one thousand times that of the enzyme in the serum. Under the conditions of study, the alkaline phosphatase activity was proportional to the concentration of the enzyme. The effect of substrate concentration on the enzyme activity was studied and the Michaelis constant (Ks) determined. An excess of substrate inhibited the enzyme. The course of the reaction was linear with time for the first 60 min.; after 90 min. the activity fell off faster than would be expected if the reaction were of the first order.

Magnesium and glycine, in low concentrations, caused an increase in the enzyme activity, whereas zinc, cyanide, borate, phosphate, bile salts, and glycine, in higher concentrations, were inhibitory. Fluoride had no demonstrable effect. Surface-active substances, such as saponin, bile salts, or alkyl sulphate, liberated the enzyme from the cells. Similar results were obtained when α-glycerophosphate or β-glycerophosphate was used as the substrate.

The alkaline phosphatase can be considered to belong to Class AI of Folley and Kay and the acid phosphatase to Class AII. The alkaline phosphatase can also be considered to be a Phosphatase II of Cloetens.

DESCLIN, L. (1947.) **Concerning the mechanism of diestrum during lactation in the albino rat.** —*Endocrinology*. **40.** 14–29. **748**

Seven albino rats in which the main ducts of the mammary glands had been transected during the last week of pregnancy, and the ovaries removed on the day of parturition, suckled two litters each. On alternate days one of the litters was placed with an unoperated lactating rat. After ten days in which the nipples had been stimulated by intense and continuous suckling, the seven rats were killed and their mammary glands and pituitaries examined histologically. There were no signs of regression of the mammae, although the milk could not escape from the glands during suckling, whereas in unoperated controls which had not suckled their young the alveoli had regressed. In the seven transected rats which had suckled litters there were no castration signs in the pituitary. The injection of 36 Riddle units of prolactin per day for ten days into spayed *post partum* rats whose young had been removed, did not prevent the appearance of castration cells in the pituitary. Since the structural changes in the pituitary of castrate rats are associated with augmentation of the gonadotrophic functions of the pituitary, the above experimental results show that suckling suppresses the gonadotrophic functions of the pituitary and that this action is not related to prolactin secretion nor to the luteotrophic action of prolactin, nor is it associated with the metabolic drain of heavy lactation.—ALFRED T. COWIE.

DESCLIN, L. (1946.) A propos du rôle de la prolactine dans le mécanisme du dioestrus de la lactation. [**The role of prolactin in the mechanism of lactation di-oestrus.**]—*C.R. Soc. Biol. Paris*. **140.** 1182–1184. **749**

D. had previously shown that castration changes (hypertrophy of the basophiles) in the pituitary did not occur in rats ovariectomized at time of littering as long as the young were being suckled. This phenomenon was thought to reflect an alteration in the gonadotrophic activity of the pituitary in the nursing animal and to be correlated with the suppression of ovarian function which commonly occurs during lactation. In view of the known anti-oestrous and luteotrophic properties of prolactin, experiments were carried out to ascertain whether prolactin could prevent the appearance of castration changes in the pituitary. After confirming in preliminary experiments the luteotrophic properties of the prolactin sample, 36 Riddle units were injected daily for ten days into 20 rats ovariectomized at the time of littering, their young being removed. At the 11th day histological examination of their pituitaries revealed castration changes which were identical with the changes in the pituitaries of 20 uninjected control ovariectomized rats. The mammary glands of the prolactin treated rats were well developed and full of milk, whereas those of the controls were atrophied. It is concluded that prolactin has no effect on the pituitary of the ovariectomized rat even when ovariectomy is carried out at littering and that the alteration in the level of gonatrophic production by the pituitary must be due directly to the suckling stimulus [see also preceding abst.].—A. T. COWIE.

EATON, H. D., JOHNSON, R. E., HELMBOLDT, C. F., SPIELMAN, A. A., MATTERSON, L. D., JUNGHERR, J. H., KRAMER, J. H., & SLATE, R. J. (1949.) **Prepartum milking. I. The effect of prepartum milking on some blood constituents of the cow.** —*J. Dairy Sci.* **32.** 870–876. [Authors' summary copied *verbatim*.] **750**

The effect of prepartum milking for 10 days prior to the calculated parturition date on the total hemoglobin, serum calcium and inorganic phosphorus, plasma carotene and vitamin A, and

mammary and umbilical edema has been studied in 48 cows. Secondarily, the effect of feeding daily one million USP units of vitamin A for 30 days prior to the calculated parturition date was measured.

Prepartum milking had no significant effect on the changes occurring at parturition in the several blood constituents, nor did prepartum milking affect significantly the mammary and umbilical edema present at parturition. The prepartum feeding of supplementary vitamin A caused a significant decrease in plasma carotene and increase in plasma vitamin A.

HENDRY, E. B. (1949.) **Haematological standards: Edinburgh 1949.**—*Edinb. med. J.* **56.** 353–358. [Part of author's summary copied *verbatim.*] **751**

The haemoglobin concentration, red cell count, packed cell volume, and derived indices are given for a series of 80 normal [human] males and 80 normal females. The figures have been analysed statistically. The haemoglobin coefficient for normal adults in this district is 14·8 Hb. per 100 c.c. of blood. This figure should be taken to represent "100 per cent. haemoglobin". There is a strong probability that, on this standard, any male with a haemoglobin below 90 per cent., or any female with a haemoglobin below 76 per cent. is pathologically "anaemic".

BALE, W. F., YUILE, C. L., DELAVERGNE, L., MILLER, L. L., & WHIPPLE, G. H. (1949.) **Hemoglobin labeled by radioactive lysine. Erythrocyte life cycle.**—*J. exp. Med.* **90.** 315–320. [Authors' summary and conclusions copied *verbatim.*] **752**

A dog, doubly depleted of blood cells and plasma proteins, was fed *dl*-lysine labeled with C^{14} in the epsilon carbon position. In the first 8 hours 28 per cent of the administered C^{14} was excreted in the urine; in the first 72 hours, 35 per cent. Twenty-four hours after feeding, 4·2 per cent of the fed C^{14} was circulating in the plasma, decreasing to 1 per cent at the end of 17 days. The C^{14} content of the blood cells increased from 1 per cent at 24 hours to 5·5 per cent in 5 days and 6·8 per cent in 22 days. Evidence based on the rate of decrease of the C^{14} content of circulating blood cells is presented indicating an average life of 115 days for the erythrocyte protein as an entity not interchanging with extracellular constituents. This corresponds closely to the life span of the dog erythrocyte, 112 to 133 days according to the best evidence otherwise available and indicates that this experiment has actually measured the life span of the dog erythrocyte. Following breakdown of blood erythrocytes the protein comprising them is not used preferentially for the formation of new erythrocytes.

YUILE, C. L., BLY, C. G., STEWART, W. B., IZZO, A. J., WELLS, J. C., & WHIPPLE, G. H. (1949.) **Plasma and red cell radioiron following intravenous injection. Turpentine abscesses in normal and anemic dogs.**—*J. exp. Med.* **90.** 273–282. [Authors' conclusions copied *verbatim.*] **753**

Sterile inflammation induced by repeated subcutaneous injections of turpentine in non-anemic, non-iron-deficient dogs, leads to a fall in plasma iron concentration, the development of a moderate anemia, and a marked delay in the uptake by the red blood cells of intravenous radioiron. Similar periods of inflammation in anemic, iron-deficient dogs on a diet low in iron cause no increase in the degree of anemia and no inhibition of red blood cell uptake of intravenous radioiron. Radioiron appears only in traces in abscess exudates. Intravenous iron disappearance curves following a single injection are uninfluenced by sterile inflammation in either anemic or non-anemic dogs. The impairment of hemoglobin synthesis caused by inflammation is at most a relative matter, since the anemia that develops is seldom severe or progressive, and since the *inhibition can be overcome* if the marrow is sufficiently stimulated by the demands of a severe continuing anemia.

JERSILD, M. (1948.) **Phagocytic activities of various types of leucocytes.**—*Acta med. scand.* Suppl. no. 213. pp. 238–246. [In English, author's summary slightly modified.] **754**

The author describes a technique whereby the phagocytic power of various forms of leucocytes against *Brucella abortus* in the presence of immune serum can be tested, and of enterococci without immune serum can be observed. Myeloid cells younger than metamyelocytes are rarely phagocytic. Lymphocytes or their pre-stages are not phagocytic. Mononuclear cells from two patients with non-leukemic myeloid splenomegaly were in active phagocytosis, even when peroxydase negative. The possibility of using phagocytosis as a biological test in this disease is discussed.

ESSEX, H. E., & GRAÑA, A. (1949.) **Behaviour of the leukocytes of the rabbit during periods of transient leukopenia variously induced.**—*Amer. J. Physiol.* **158.** 399–400. [Authors' summary and conclusions copied *verbatim.*] **755**

Observations have been made of the behaviour of the leukocytes as seen in the blood vessels that had grown into transparent chambers inserted into the ears of rabbits. The intravenous injection of extract of Ascaris suum, hydatid cyst fluid, solutions of acacia, glycogen and dextran, and many other substances caused the leukocytes to become sticky. They adhered to the vascular

endothelium and to each other forming large clumps.

During the time when the leukocytes were adhesive, there was profound leukopenia. The duration of this phenomenon did not usually exceed 90 minutes. It may be concluded that the transient nature of the leukopenia observed in these experiments can be accounted for on the basis of the leukocytes being temporarily out of circulation as a result of their adhering to the vascular endothelium and to each other. The possible relation of the adhesiveness of the leukocytes to certain inflammatory reactions is discussed.

COLFER, H. F., DE GROOT, J., & HARRIS, G. W. (1949.) **Pituitary gland and blood lymphocytes.** —*J. Physiol.* **109.** Nos. 3 & 4. p. 29P. [Only abst. given, copied *verbatim.*] **756**

Emotional stress in rabbits is followed by a marked drop in the number of lymphocytes in the blood. The effect is maximum at about the third hour after the stress stimulus. This response is abolished by hypophysectomy, although injection of anterior-pituitary extract or purified adrenocorticotrophic hormone still produces a lymphopenia in the hypophysectomized rabbit. This effect of emotional stress on the blood lymphocytes may be used as a rapid indicator of anterior-pituitary activity.

AHRENS, E. H., Jr., & KUNKEL, H. G. (1949.) **The stabilization of serum lipid emulsions by serum phospholipids.**—*J. exp. Med.* **90.** 409–424. [Authors' conclusions copied *verbatim.*] **757**

Clarity of high lipid sera is closely correlated with elevated proportions of serum phospholipids, and lipemia (milkiness) with low proportions of phospholipids. Clear high lipid sera occur uniquely in obstructive jaundice, both intra- and extrahepatic in origin. Destruction of the polar nature of serum "lecithin" by enzymatic hydrolysis, using *Cl. welchii* lecithinase, results in a degree of lipemia which is linearly proportional to total lipid content in clear or lipemic high lipid or normal lipid sera. Even in grossly lipemic sera, a significant proportion of the serum lipids is masked in particles of invisible size. Enzymatic removal of the stabilizing properties of serum "lecithin" unmasks this hitherto invisible fraction. The concentration of serum phospholipids available for complex formation with serum proteins appears to be an important factor in determining particle size of serum lipids and hence of their occurrence in serum as masked or as visible particles. The implications of these findings for studies of the genesis of atheromatosis are discussed.

WHITTEN, W. K. (1949.) **Enzymic inactivation of serum gonadotrophin. [Correspondence.]**—*Nature, Lond.* **163.** 534. **758**

Aliquot samples of serum gonadotrophin dissolved in phosphate buffer, pH 7·0, were incubated at 37°C. for 1 hour with equal volumes of (1) saline; (2) 1 : 1,000 solution of *Clostridium welchii* (Type B) culture filtrate partially purified in respect of the enzymes which destroy the serological characteristics of the blood-group substances A, B and O; and (3) a 1 : 1,000 enzyme solution previously heated for 1 hour at 56°C. to inactivate the enzyme which destroys substances A and V. The activity of the incubated gonadotrophin aliquot samples was assayed on rats. The hormone was found to have been inactivated by both the heated and unheated enzyme preparations, indicating that the enzyme involved may be identified with that which destroys substance O.

It is suggested that serum gonadotrophin and the blood-group substances are similar in that they form common substrates for certain enzymes.

—ALFRED T. COWIE.

PHILLIPSON, A. T. (1949.) **Absorption of acetate from the rumen of sheep.**—*J. Physiol.* **109.** Nos. 3 & 4. pp. 31P–32P. [Only abst. given, copied *verbatim.*] **759**

The concentration of acetate in the rumen is normally between 0·03 and 0·13M and the pH between 6 and 7. It is important to know whether the anion is absorbed. [See *V. B.* **15.** 201–202, & Grey (1948).]

The rumen and reticulum and omasum, or the rumen and reticulum, were separated from the remainder of the alimentary canal by ligature under nembutal anaesthesia, and solutions of sodium acetate were placed in the empty rumen. The higher concentration of acetate in the venous blood from the rumen showed that absorption occurred, and the arterio-venous difference increased as the concentration in the rumen increased. Absorption from normal rumen liquor made alkaline with bicarbonate was similarly demonstrated.

With three sheep fitted with a rumen cannula 3 weeks or more before the experiment, the loss of acetate from the rumen was 2·58, 2·06 and 3·35 g.[hr. (as acetic acid), but in two animals fitted with a cannula immediately before the experiment the loss was only 1·63 and 0·57 g./hr.

LOMBARD, L., & MORGAN, B. B. (1949.) **The morphology of the oviduct of virgin heifers in relation to the estrous cycle.**—*J. Anim. Sci.* **8.** 641–642. [Only abst. given, slightly modified.] **760**

The gross anatomy and histology of the oviducts were studied in 33 clinically normal virgin

heifers slaughtered at intervals covering the whole estrous cycle. The oviduct can be divided into three parts ; isthmus, ampulla and infundibulum. The wall consists of three layers ; tunica mucosa, tunica muscularis and tunica serosa. The mucosal ciliated epithelium was pseudostratified columnar throughout the length of the oviduct. Three types of cells were seen in the epithelium ; ciliated columnar cells, peg or intercalary cells and spherical cells. The various regions of the oviduct have distinct characteristics primarily in the number of mucosal folds. Complete cellular changes in relation to the estrous cycle were studied. The presence of edema and granules in the epithelial cells was most pronounced from one day before to two days after estrus. Mucus-like material in the oviduct was more abundant during three to four days postestrus while cytoplasmic projections of the epithelial cells occurred during proestrus. The height of the epithelium was during proestrus 32·6 microns, estrus 45·3 microns, one to five days postestrus 43·8 microns and 26·6 microns during six to fifteen days postestrus.

WEBER, A. F., & MORGAN, B. B. (1949.) **Cyclic histological changes occurring in the endometrium of the virgin heifer.**—*J. Anim. Sci.* **8.** 646. [Only abst. given, copied *verbatim*.] **761**

The histology of the endometrium was studied in 33 virgin heifers slaughtered at intervals to include all days of the cycle. A statistical study of cyclic changes in epithelial height together with histological observations suggested that the uterine glandular epithelia did not regress until immediately before the following estrus. Interstitial tissue degeneration was not found to occur, and vascular changes during the period 13 to 19 days postestrus were considered to be insignificant. It was impossible to demonstrate secreted substances in the uterine glands or in the uterine lumen. The lymphocyte infiltration that followed the increase of neutrophiles began about the 3rd day postestrus and completely receded by the 7th day postestrus. Eosinophils were found to be uniformly scarce in the endometrium, except in two heifers. Plasma cells were uniformly scarce, except in those cases where lymphoid nodules were present. The uteri of these two heifers were considered abnormal.

HITCHCOCK, M. W. S. (1949.) **Fructose in the sheep foetus.**—*J. Physiol.* **108.** 117–126. [Author's summary copied *verbatim*.] **762**

The levels of fructose and glucose in the foetal and maternal bloods of sheep were followed during the second half of the gestation period. The level of fructose in the foetal blood was found to fall towards term and that of glucose to rise from a low level to one normal for the maternal blood. A constant loss of glucose by the maternal blood traversing the placenta was demonstrated and found to be equivalent, in qualitative terms, to the average gain by the foetal blood. The concentration of fructose in the maternal blood was always insignificant as compared to that in the foetal blood. The distribution of total sugar between the corpuscles and plasma in the blood of foetal sheep during the latter third of pregnancy was found to be uniform ; a higher concentration of glucose in the corpuscles was balanced by their having only three-quarters the concentration of fructose found in the plasma.

JENKINS, W. R., & BOHREN, B. B. (1949.) **The effect of colchicine on the seminiferous tubules of fowl testis.**—*Poult. Sci.* **28.** 650–652. [Authors' summary copied *verbatim*.] **763**

Intraperitoneal injections of colchicine at the rate of 2 mg./kg. caused paralysis and death in 14 week old cockerels. The effect of the drug was general and could not be detected cytologically. Injection of colchicine (12 gamma in $\frac{1}{2}$ cc. of saline) directly into the testis of 14 week old cockerels gave no response, probably due to the immaturity and inactivity of the cellular elements in the tubules. Injection of 12 gamma of colchicine per testis in mature males caused an accumulation of meiotic figures 24 hours following treatment. No degeneration occurred and the tissues had resumed normal activity by the seventh day following treatment. Larger doses (24 gamma per testis) caused severe degeneration so that by the seventh day only the germinal layer remained. Regeneration followed and 21 days after treatment the tubules were functioning normally. The rapidly dividing cells during the regeneration period provided excellent material for observing mitotic and meiotic divisions.

LIU, T. Y., & TURNER, C. W. (1949.) **The metabolism of the lactogenic hormone.**—*J. Dairy Sci.* **32.** 881–888. [Authors' summary copied *verbatim*.] **764**

Cow manure free from urine and extraneous materials was collected and dried in an electrical drying oven at a temperature of about 45°C. for about 48 hours. Forty per cent aqueous alkaline ethyl alcohol extracts of individual samples of lactating cow and bull manure were precipitated by increasing the alcohol concentration to 75 per cent at pH 5·7 under cold conditions. The average yield of lactogenic hormone from one kilogram dry manure ranged from 0·29 to 1·25 international units for the high milk producers, from 0·23 to 0·3 international units for the low milk producers, and from 0·17 to 0·19 international units for the bulls.

It was concluded that there might be a

relationship between the amount of lactogenic hormone excretion into the digestive tract and the milk producing ability. Possibly lactogenic hormone is secreted into the digestive tract, but only that part which is excreted in the lower portion of the intestine is excreted together with the feces in an active form.

BAKER, B. L., & WHITAKER, W. L. (1949.) **Relationship of the adrenal cortex to inhibition of growth of hair by estrogen.**—*Amer. J. Physiol.* **159.** 118–123. [Authors' summary copied *verbatim*.] **765**

Adult female rats were divided into the following groups: (1) ovariectomized, oil treated; (2) ovariectomized estrogen-treated; (3) adrenalectomized, ovariectomized, oil-treated, and (4) adrenalectomized, ovariectomized, estrogen-treated. Prior to the operations, alpha-estradiol dipropionate was injected into the rats of groups 2 and 4 at a daily dose of 20 to 40 μg. until growth of hair was suppressed for 3 successive weeks. It was found that although estrogen maintained this inhibition subsequent to ovariectomy, after adrenalectomy it failed to prevent the acceleration in rate of hair growth which normally follows this operation.

OPSAHL, J. C. (1949.) **Dermal spreading of India ink with and without hyaluronidase as influenced by hormones from the adrenal cortex.**—*Yale J. Biol. Med.* **21.** 487–498. [Author's conclusions copied *verbatim*.] **766**

Adrenal cortical extracts inhibit the intradermal spreading of India ink with hyaluronidase in rabbits. When administered intravenously, the inhibitory effect of A.C.E. is most marked at 1 hour and progressively diminishes over a period of 24 hours. A.C.E. given intradermally at the site of enzyme-India ink injection is considerably more effective over a longer period of time than when it is given intravenously. Although A.C.E. inhibits the enhanced spreading caused by hyaluronidase in rabbits, in the absence of hyaluronidase there was a doubtful influence on spreading. Administered systemically, massive doses of A.C.E. appear to be required for prolonged maximal inhibition.

See also abstr. **606** (electrocardiogram); **695** (teeth of rats); **789** (birds); **808** (milk).

PUBLIC HEALTH, VETERINARY SERVICES AND VETERINARY EDUCATION

KÄSTLI, P. (1948.) Störungen in der Milchverarbeitung durch die Mastitisbehandlung mit Penicillin. [**Damage to the dairy industry caused by the use of milk of cows that have been treated with penicillin.**]—*Schweiz. Arch. Tierheilk.* **90.** 685–694. **767**

One unit of penicillin in 10 ml. of whey inhibits the growth of lactic acid bacilli, so cultures for use in cheese making could not be grown from such whey. In milk from single quarters that had received 20,000 units, 3–4·5 units per ml. were present after 12 hours and 0·2–0·4 units per ml. after 24 hours.

Three hundred and ten l. of milk to which 3·3 l. of milk from two treated quarters were added contained 0·4 units of penicillin, the cheese produced was faulty and became distended when in the press owing to multiplication of gas-forming bacteria (*coli-aerogenes*).

To avoid difficulties in cheese manufacture, milk delivered to the factory for cheese production should be from cows to which no treatment with penicillin has been given for at least four days previously.—W. STECK.

AHMAD, B., CHAND, R., & MANSOOR-UL-HASSAN. (1946.) **Observations on the vitamin A content of buffalo butter-fat (ghee). Effect of the method of preparation, storage and cooking.**—*Indian J. med. Res.* **34.** 75–85. **768**

A non-saponifiable fraction occurring in 48 samples of ghee was assayed for vitamin A by ultra-violet spectrophotometry and gave values within the range of 14–40 international units per g., the mean value being 25·4 I.U. per g.; 20 samples including six market samples contained less than 24 I.U. per g. Heating at 90°–200°C. for 3–25 min. caused very little destruction of the vitamin, but the loss was nearly 30% when the heating was continued for 2–4 hours at 60°–90°C. Storage for one month at room temperature (summer) caused no loss, but after four months' storage the loss was between 2·5–22·5% and after six months it was 25–30%.—S. N. RAY.

DACK, G. M., NIVEN, C. F., Jr., KIRSNER, J. B., & MARSHALL, H. (1949.) **Feeding tests on human volunteers with enterococci and tyramine.**—*J. Infect. Dis.* **85.** 131–138. [Authors' summary copied *verbatim*.] **769**

Experiments involving 52 feeding tests on 37 volunteers were carried out with the object of determining the safety of using a specific strain of *Streptococcus faecalis* as a starter culture for cheese. Since strains of *Str. faecalis* have been associated with food poisoning outbreaks and since they have been shown to decarboxylate tyrosine to produce tyramine, it was necessary to feed cheese made with the starter strain as well as cultures of the starter strain and, in addition, to determine whether tyramine may play a role in food poisoning. Cultures from three strains of enterococci implicated in outbreaks of food poisoning were fed to human volunteers for control purposes.

Cheese made with the starter strain of *Str. faecalis* and which contained large numbers of viable organisms as well as appreciable quantities of tyramine was without effect when fed to human volunteers. Tyramine monohydrochloride, in 0·3 or 1 g amounts, when fed to human volunteers in one pint of milk, caused no rise in blood pressure or any other ill effects.

Illness occurred in two and possibly a third volunteer fed a milk culture of a strain of *Str. liquefaciens* recently isolated from an outbreak of food poisoning. *Str. faecalis*, in two strains from other outbreaks, was without effect when similarly fed to human volunteers. A discussion of the status of our knowledge of food poisoning caused by enterococci is detailed in the paper.

PALS, C. H. (1948.) **The inspection of meat.**—*J. Milk Food Technol.* **11.** 38–43. **770**

A commentary on a recent film "Meats with Approval". Meat inspection under U.S.A. Federal auspices was started in 1906 as a result of a public outcry after the publication of a novel in which certain undesirable methods were alleged to be employed in "meat packing" factories. Even now, only two-thirds of the animals slaughtered for meat in the U.S.A. are inspected, and, as 7% of these are found to be diseased it is presumed that a large quantity of unsound meat is still being consumed. It is recommended that all unsound meat should be thoroughly denatured with strong carbolic before being passed on to the rendering factories.

—R. MACGREGOR.

MARTINEZ, C. R. (1948.) Conservacion de los alimentos por el frio. Inspección veterinaria de las carnes y pescados congelados. **[Veterinary inspection of frozen meat.]**—*Rev. grancolomb. Zootec. Hig. Med. vet.* **2.** 326–405. **771**

A detailed study of frozen and chilled food of animal origin. "Frozen" meat is defined as meat lowered to between –8° and –11°C. It keeps indefinitely at these temperatures, but loses much of its flavour and aroma owing to the evaporation of volatile oils, and it is unattractive in appearance. "Chilled" meat, lowered to between +2° and +4°C. will not keep so long, but retains its fresh red colour with yellow-white fat, and has a pleasing aroma of its own quite different from that of fresh meat. In inspecting it, attention should be paid to the surfaces which may have become warmed in patches, or be dry or even completely dehydrated (mummified) or rancid; deep inspection may reveal warm regions, penetration of moulds or bacteria, or the multiplication of bacteria present in flesh and causing bone taint. Sections of this long and interesting paper also deal with chilled and frozen offal, game, birds, fish and milk.

—R. MACGREGOR.

BATE-SMITH, E. C. (1948.) **Observations on the pH and related properties of meat.**—*J. Soc. chem. Ind., Lond.* **67.** 83–90. **772**

The ultimate pH of muscle, in full rigor varies inversely with the glycogen content of the living muscle. The ultimate pH may reach a value not lower than 5·3 or if the animal was very active before death, it may be as high as 7. Beef at pH below 5·5 may contain as much as 0·4% of glycogen, but in mutton or pork the pH reaches 5·7 or lower much less frequently and these meats are less likely to contain glycogen. The lactic acid content of the blood is an indication of whether the animal had rested or been active just before death.—E. M. J.

INGRAM, M., & HAUGE, S. (1948.) **Bacteria in the flesh of Norwegian fin whales.**—*Norsk Vet-Tidsskr.* **60.** 397–412. [In English.] **773**

Whale meat tends to become emphysematous on putrefaction, owing to the presence of bacteria of certain types. Hitherto it has been believed that these were all external in origin and only invaded the meat after death and after being cut up. The authors found that the bacteria may occur in the tissues during life, but believe that they invade the musculature from the gut *via* the blood and lymph streams. Some may invade before death when the animal is fatigued, but it is probable that most do so after death and before evisceration, a period that may exceed 24 hours. Distribution is probably helped by the movements of the body while being towed.—R. MACGREGOR.

O'CONNOR, J. A. (1948.) **The use of blood anticoagulants for rodent control.**—*Research.* **1.** 334–336. **774**

Dicoumarin [3,3'-methylene-bis-4-hydroxycoumarin] was found to be an effective rat poison without the disadvantage of producing "bait-shyness". It acts slowly by inducing a fatal haemorrhagic disease rather than by acute poisoning. The rats eat the treated bait until death ensues and the difficulty of the sublethal dose does not occur.—E. M. J.

I. EDWARDS, J. T. (1948.) **The veterinary press: its evolution and present trends.**—*Vet. Rec.* **60.** 498–502. **775**

II. GLOVER, R. E. (1948.) **The veterinary press: its evolution and present trends.**—*Ibid.* 502–504. **776**

I. This is an historical survey of world veterinary literature since the time of the founding of the first of the European veterinary schools during the last century, together with notes on the personalities connected with them. It comprises an excellent background of information on the subject, without being as complete or dull as a

catalogue. British and European publications are of course mainly in the picture.

II. This deals with present-day matters and G. examines the modern veterinary press and its usefulness and value and gives views about the preparation of abstracts and reviews and about the role of editors.—J. E.

CHEN-HSIA, S. (1948.) **A brief history of the veterinary science in China.**—*Vet. Med.* **43.** 454–458. **777**

In 1904 a Veterinary School was opened, first at Paoting and later at Peiping where it was organized as the Army Veterinary School. In 1929 the Department of Animal Husbandry and Veterinary Medicine of the Agricultural School of the National Central University was organized, its students mainly taking up teaching. In 1932 the Veterinary School at Shanghai was opened to train meat inspectors and men to control epizootics. In 1937 Kiansi Provincial Veterinary School was established and in 1947 the Northwest Veterinary College at Langchow, since when departments of veterinary medicine, combined in some cases with animal husbandry, have been instituted in many agricultural colleges, such as Chunshang University at Canton, Kwansi University at Liuchow, Taiwan University at Taipei, Peking University at Peiping, Jinshih University at Chinghwa, Northwest Agricultural College at Wuckong, etc. In Manchuria there are two important veterinary schools, at Mukden and Chanchung, inactivated by the civil war.—R. MACGREGOR.

See also absts. **580** (food-poisoning in man); **815-816** (Mauritius, Reports); **818** (Zanzibar, Report).

LIVESTOCK HYGIENE

WRIGHT, F. (1948.) **Electrostatic filtration.**—*J. Instn. Heat. Vent. Engrs.* **16.** 363–390. [Discussion pp. 390–402.] [Abst. in *Bull. Hyg., Lond.* **24.** 425–426. (1949), copied *verbatim.* Signed: THOMAS BEDFORD.] **778**

The electrostatic precipitator is being used to an increasing extent for the filtration of air in ventilation installations. In this excellent paper the author presents the elementary principles of electrostatic precipitation, and then describes the current use of these precipitators in ventilation practice, and he includes an account of recent American developments. He gives a useful section on test methods employed for appraising the efficiency of filters, and refers to the high efficiencies that can be achieved in electrostatic filters, even when the suspended matter is very fine. He concludes that a mechanical filter might be constructed of an efficiency approaching that of the electrostatic type, but that its first cost would be within the range of that of an electrostatic filter, and its maintenance cost would be heavy. The paper evoked a useful discussion.

DEMETZ, J. (1947.) Hygiène des pâturages et prophylaxie des maladies parasitaires. [**Hygiene of pastures and prevention of helminth infections.**]—*Thesis, Alfort.* pp. 178. **779**

D. divided his thesis into three parts: (a) methods of infection of pastures; (b) methods of infection of animals; (c) methods of production and maintenance of hygienically good pastures. In each part the relevant literature is reviewed and numerous references are cited. No original work is included.—M. L. CLARK.

REPRODUCTION AND REPRODUCTIVE DISORDERS

STEGENGA, T. (1947.) Enkele ervaringen op het gebied der kunstmatige-inseminatie. [**Experiences in artificial insemination.**]—*Tijdschr. Diergeneesk.* **72.** 58–60. **780**

In S.'s experience artificial insemination has not been a success, by reason of the poor conception rate and prevalence of infection transmitted. The poor results are discussed under three headings—bad selection of bulls, lack of expert supervision and poor organization.—J. E.

DALGAARD-MIKKELSEN, S., KVORNING, S. A., & RASBECH, N. O. (1947.) **On hyaluronidase concentration in bull semen.**—*Skand. Vet-Tidskr.* **37.** 661–676. [In English.] **781**

A viscometric technique is described for determining hyaluronidase in bull semen. When the spermatozoa are removed from fresh semen by centrifugation the hyaluronidase content of the plasma remains constant during storage for three days at 2°C., whereas in untreated semen the hyaluronidase content of the plasma rises to over twice its original value during this period of storage. Hyaluronidase determinations made on semen samples from 21 bulls revealed a positive correlation between hyaluronidase concentration and sperm density. Semen samples from five bulls of high fertility all had a high hyaluronidase content and a high sperm density. It is postulated that the addition of hyaluronidase to the diluents used in artificial insemination might allow of higher dilutions of semen being used without a reduction in fertility.—A. T. COWIE.

SYKES, J. F., WRENN, T. R., MOORE, L. A., UNDERWOOD, P. C., & SWEETMAN, W. J. (1949.) **The effect of testis biopsy on semen characteristics of bulls.**—*J. Dairy Sci.* **32.** 327–333. **782**

Biopsies on the left testicles of three bulls were followed by a fall in the sperm concentration in spite of a concurrent improvement in the animals' rations. Six to fifteen months later biopsies on the right testicles were followed by a decrease in motility and an increase in the concentration of abnormal spermatozoa. The bulls were castrated three months after the second biopsy and histological examination of the testicles revealed degeneration of the tubules and proliferation of the connective tissue. E. J. H. F.

FOOTE, R. H., & BRATTON, R. W. (1949.) **The fertility of bovine semen cooled with and without the addition of citrate-sulfanilamide-yolk extender.**—*J. Dairy Sci.* **32.** 856–861. [Authors' summary copied *verbatim.*] **783**

Sixty-four ejaculates of bovine semen were divided and cooled from 30°C. to 5°C. in 75 minutes with and without the addition of citrate-sulfamilamide-yolk extender prior to cooling.

Based on 60- to 90-day non-returns to 8,518 first and second service cows, the fertility level of the pre-extended semen (semen cooled in extender) was 59·3 per cent and that of the post-extended semen (cooled without extender), 52·8 per cent. The difference between treatments of 6·5 percentage units was highly significant statistically.

Motility estimates made after 3, 24, 48, 72 and 96 hr. of storage indicated that the samples cooled without extender had a definite lower percentage of motile spermatozoa. However, by using covariance analysis the higher per cent non-returns for the pre-extended semen could not be accounted for on the basis of more motile spermatozoa per insemination.

PRINCE, P. W., ALMQUIST, J. O., & REID, J. J. (1949.) **Bacteriological studies of bovine semen. II. The incidence of specific types of bacteria and the relation to fertility.**—*J. Dairy Sci.* **32.** 849–855. [Authors' summary copied *verbatim.*] **784**

By the use of special selective media the incidence of *Pseudomonas aeruginosa*, coliform organisms and streptococci was determined in undiluted semen from bulls used for artificial breeding. In addition, the predominant types of bacteria present in semen were isolated and classified according to morphological and biochemical characteristics.

P. aeruginosa was confirmed in semen samples from both fertile and relatively infertile bulls. The organism was confirmed in all ejaculates examined from three fertile and two infertile bulls. Even in numbers of at least 1,000 per ml. the presence of the organisms was not indicative of level of fertility. However, the consistent presence of the organism in semen of the infertile bulls indicated that it may be associated with individual cases of infertility.

Coliform organisms were found only occasionally in semen from bulls at various levels of fertility. The presence of the group was associated with high plate counts of semen and may represent fecal contamination of the sample at the time of collection.

Members of the genus *Streptococcus* were not characteristic of the seminal flora. Gram-positive rods, especially diphtheroids, were found to be predominant in the flora of bull semen. These organisms comprised a greater portion of the flora of fertile bulls than that of relatively infertile bulls. Gram-positive micrococci were found next in frequency to the diphtheroidal flora. It perhaps was significant that the proportion of the flora represented by these forms was slightly greater in the case of bulls of low fertility.

Although the gram-negative rods encountered appeared as non-pathogenic types commonly present in nature, a greater percentage was found in semen from the relatively infertile bulls and the presence of certain of these organisms in semen may be associated with infertility.

SMITH, A. U. (1949.) **The control of bacterial growth in fowl semen.**—*J. agric. Sci.* **39.** 194–200. [Author's summary copied *verbatim.*] **785**

The bacteria commonly found in freshly collected fowl semen are coliform bacilli, staphylococci, diphtheroid bacilli and haemolytic streptococci. These organisms are probably derived from the cloaca, which usually has the same flora as the expressed semen, while the sperm mass from the vas deferens is sterile. In diluted or undiluted semen stored for 24 hr. at room temperature, or 48 hr. at 2°C., there is a great increase in the bacterial population, especially of coliform bacilli. Although the presence of egg white did not diminish the growth of bacteria in stored diluted semen it improved the motility of the spermatozoa. Sulphathiazole in the concentrations used proved toxic to the spermatozoa, and unreliable for bacteriostasis. Streptomycin in concentrations of 50, 100 and 200 μg./ml. effectively checked bacterial growth, but did not improve the motility or fertilizing power of spermatozoa in stored diluted semen.

SCHWEITZER, F. L., & BAS, J. A. (1949.) Nueva reacción diagnóstica de la preñez de yeguas. **[Pregnancy diagnosis in mares.]**—*Gac. vet., B. Aires.* **10.** 23–28. **786**

A preliminary series of pregnancy diagnosis tests using the male *Bufo arenarum* as test animal on 72 mares gave unsatisfactory results. A second series of tests, injecting 12 ml. of citrated plasma instead of 10 ml. gave more promising results.

Toads weighing approximately 100–110 g. were used and the cloaca was examined for spermatozoa 3–6 hours after injection. If no spermatozoa were observed a further examination was made at the 22nd to 24th hour. Tests on 31 non-pregnant mares were all correct but four false negative results were obtained in tests on 37 pregnant mares. In three of these cases, however, the mares were only 48–49 days pregnant when the gonadotrophin in the blood is only beginning to rise. It is considered that the male-toad test will be useful for pregnancy diagnosis in mares if the test be carried out between the 55th–80th day when the gonadotrophin in the blood is at a high level.—A. T. C.

Bern, H. A. (1949.) **A note on epithelial metaplasia in the male genital tract.**—*Endocrinology.* **44.** 555–558. **787**

During investigations on the effect of oestrogen treatment, for long and short periods, on 80 male Dutch rabbits, keratinized nodular lesions were found in the prostate of 45% and in the vesicular gland of 71% of the rabbits. Although histologically the lesions were indistinguishable from those caused by avitaminosis, cod-liver oil did not prevent or alleviate these lesions.—A. T. C.

Mann, T., Davies, D. V., & Humphrey, G. F. (1949.) **Fructose and citric acid assay in the secretions of the accessory glands of reproduction as indicator tests of male sex hormone activity.**—*J. Endocrinol.* **6.** 75–85. [Authors' summary copied *verbatim.*] **788**

The secretion of both fructose and citric acid in the male accessory organs of reproduction occurs only in the presence of the male sex hormone, and is subject to characteristic fluctuations in response to decreased or increased activity of the testicular hormone in the male body. This makes it possible to use the assay of fructose and citric acid as an indicator for the male hormone. In young normally developing males fructose and citric acid appear in the accessory glands of reproduction at an early stage when there is as yet no sign of active spermatogenesis. This is interpreted as evidence that the testicular hormone begins to function in the body some time before actual spermatogenesis.

In the bull, both fructose and citric acid are formed chiefly in the seminal glands, which are also distinguished by a high content of adenyl phosphatase (5-nucleotidase). An anatomical, histological and chemical study has been made of the bull seminal glands at maturity and at the various stages of sexual development. On the whole, the morphological changes in the developing glands and the development of the chemical functions run parallel but individual variations are well pronounced. Bull-calves castrated early in life, at an age prior to the appearance of fructose and citric acid in the seminal glands, are unable to produce either fructose or citric acid in the course of their later development; a 9-month-old castrate has little fructose or citric acid in the seminal glands whereas a normal bull of this age is distinguished by a high content of both substances. However, a rapid formation of both fructose and citric acid can be induced in the castrate animals by 1 month's treatment with testosterone propionate. The difference in the contents of fructose and citric acid between untreated and treated calves is considerable and contrasts strikingly with the rather small cytological recovery changes which result from the relatively brief treatment with testosterone.

Kumaran, J. D. S., & Turner, C. W. (1949.) **The endocrinology of spermatogenesis in birds. II. Effect of androgens.**—*Poult. Sci.* **28.** 739–746. [Authors' summary copied *verbatim.*] **789**

A study is reported concerning the influence of the male hormone, testosterone, upon the component parts of the testes of White Plymouth Rock cockerels. It was observed that the administration of the male hormone at 10 mg per kg. feed or more depresses the secretion of FSH. Without the support of this hormone, the secondary and primary spermatocytes involute, leaving only the spermatogonium.

The administration of lower levels of male hormone in cockerels eight weeks old or less was ineffective but when the secondary spermatocytes have developed in the 10 week-old birds, then the administration of the male hormone stimulated a marked increase in testis weight due to the stimulation of an increase in spermatid formation.

It was concluded that the gonadotrophic hormone, FSH, is essential for the growth of the primary spermatocytes and the meiotic or reduction division involved in the production of secondary spermatocytes. When this stage is reached, the male hormone normally secreted by the interstitial cells of Leydig plays a role in the transformation of the secondary spermatocytes into spermatids.

Marlow, H. W. 1948.) **Comb-testis relationship.**—*Endocrinology.* **43.** 71–77. **790**

Removal of the combs of chicks at three days of age resulted in a significant increase in the size of the testes by the sixth week. Topical applications of a purified alcoholic extract of cockerels' combs to the combs of chicks resulted in an enlargement of the combs and testes over those of the controls. Assays of the comb-extract indicated the presence of an androgenic substance.
—A. T. Cowie.

Gowe, R. S. (1949.) **Residual estrogens in the tissues of fowl treated with dienestrol diacetate.**

—*Poult. Sci.* **28.** 666–669. [Author's summary copied *verbatim.*] **791**

Biological assays were made to determine the quantity of residual estrogen remaining in the flesh and skin, liver, gizzards, hearts, and abdominal adipose tissues of 11 cockerels which had been fed dienestrol diacetate over a 13 week period. In 100 grams of muscle and skin tissue from each of 7 birds there was less than 14·5γ of dienestrol per 100 grams. The same tissue of three others contained more than 12·2γ of dienestrol per 100 grams, while in the flesh and skin of one cockerel there was approximately 14·5γ of dienestrol per 100 grams of tissue. All the other tissues assayed contained negligible amounts of estrogen.

Bisset, K. A. (1949.) **The influence of adrenal cortical hormones upon immunity in cold-blooded vertebrates.**—*J. Endocrinol.* **6.** 99–103. [Author's summary copied *verbatim.*] **792**

The release of serum agglutinins, which is inhibited at low temperatures, in frogs and fish is restored by injection of adrenal cortical extracts. These extracts have no effect upon the process of immunization. The phenomena of temperature-immunity control in these animals are probably due to inhibition of production of adrenal cortical hormones at low temperatures.

Vander Noot, G. W., Reece, R. P., & Skelley, W. C. (1949.) **Influence of estrogen alone and in conjunction with pregnant mare serum in anestrous ewes.**—*J. Anim. Sci.* **8.** 583–589. [Authors' summary copied *verbatim.*] **793**

Of 14 ewes injected subcutaneously with 1·4 mg. of estradiol dipropionate, 11 mated within 14 days and one lambed; estradiol was relatively ineffective in inducing estrus. The oral administration of 20 mg. of the dimethyl ether of hexestrol failed to induce estrus. No evidence was obtained that would indicate that estrogen treatment will initiate the estrous cycle in anestrous ewes.

Of 19 ewes receiving estrogen 15 to 17 days prior to a single injection of 250 rat units of PMS, 6 mated and lambed.

Hancock, J. L. (1949.) **Evidence of an inherited seminal character associated with infertility of Friesian bulls.**—*Vet. Rec.* **61.** 308–309. **794**

Examination of semen samples from seven Friesian bulls revealed that on an average from 79–96% of the spermatozoa had a head deformity, demonstrated, in smears stained with iron haematoxylin, by a deeply stained area placed somewhat laterally at the anterior pole and, in smears coloured with Indian ink, by a refractile unstained area in the same position. The bulls had been used in six different herds, all under separate ownership and management, on a total of 108 cows, all of which proved barren. One bull was sold and it is claimed that it sired several calves in another herd, but this claim is regarded with some suspicion. The clinical histories of the 108 barren cows when mated with fertile bulls indicated that they were of normal fertility.

Two bulls participated in the pedigree of all seven infertile bulls and, in all except one, this relationship existed on both the male and female sides of the pedigree.—J. O. L. King.

Rollinson, D. H. L., & Makinson, J. B. (1949.) **Evidence of an inherited seminal character associated with infertility of Friesian bulls. [Correspondence.]**—*Vet. Rec.* **61.** 373. **795**

A Friesian bull of similar breeding to those described in the previous abstract was examined. Between 9 and 21 months of age the bull gave 34 services to 5 cows and 15 heifers, none proving fertile. Semen examinations revealed the abnormality of the spermatozoa heads in fresh preparations, and stained smears revealed that 16–42% were affected. In smears made 24 hours after collection 30% were affected, and at 96 hours 10%. The motility and the viability of the semen were subnormal, and the testes were approximately three-quarters normal size.—J. O. L. King.

Hofmeyr, C. F. B. (1948.) **Clinical experiences with pregnant mare serum (P.M.S.) in functional sterility in cows.**—*J. S. Afr. vet. med. Ass.* **19.** 144–145. **796**

H. considers that pregnant mares' serum gonadotrophin (P.M.S.) is contra-indicated in cases of anoestrus caused by the retention of the corpus luteum, the proper treatment of these cases being expression of the corpus luteum. H. recommends that when anoestrus is caused by hypoplastic ovaries, possible nutritional causes should be eliminated before hormonal therapy is attempted. When P.M.S. is used it is inadvisable to serve the animals at the first oestrus in case superovulation has occurred.—A. T. Cowie.

Roark, D. B., Laben, R. C., & Herman, H. A. (1949.) **Preliminary studies on the histology of the reproductive organs of sterile cows.**—*J. Anim. Sci.* **8.** 644. [Only abst. given, copied *verbatim.*] **797**

A histological study of the genital organs of non-breeding cows was made to determine if observable changes in the tissues might throw light on the reason for sterility. From November 1947 to July 1949, twenty dairy cows were sold for slaughter from the University herd. Fourteen of these were classed as non-breeders. Tissue sections from the vagina, cervix, uterus, oviducts, and ovaries were studied to determine histopathological changes which might have taken place. Three of the animals which showed normal breeding histories served as controls. Immediately

after killing, the entire genital tract was removed and given first attention. The organs were examined thoroughly and notations on the gross anatomy recorded. The tissues were placed in Bouin's fixative, subsequently dehydrated in alcohol, embedded in paraffin and sectioned at 8 to 10 micra. Delafield's hematoxylin, Mayer's hemalum, eosin and erythrosin were used for routine stains. Special stains used were Mayer's mucicarmine to demonstrate mucus and Wilder's silver impregnation technique for reticulum and collagenous fibers. Measurements of thickness of the epithelium and stroma were made with an eyepiece micrometer. Examination of organs revealed two cases of double external os, anterior to which was a single cervical canal. In four non-breeders, severe tubal and ovarian adhesions were found. Microscopic examination suggested acute to chronic salpingitis in two of three cases. Records of productive, reproductive and clinical histories are available for all cows. The records of non-breeders and of their close relatives were studied.

WARNICK, A. C., GRUMMER, R. H., & CASIDA, L. E. (1949.) **The nature of reproductive failures in repeat-breeder sows.**—*J. Anim. Sci.* **8.** 569–577. [Authors' summary copied *verbatim.*] **798**

Data are presented on 63 females that had been bred at 2 to 4 different heat periods without conceiving. Repeat breeding was due to a failure of fertilization in 53·4 percent of the gilts and 32·6 percent of the sows. Accountable failure of fertilization due to bilateral tubal abnormalities, bilateral missing segments, or bilateral cystic follicles comprised 50·0 percent of the gilts and 15·8 percent of the sows. Unaccountable failure of fertilization (no gross barriers present) made up 3·4 percent of the gilts and 16·8 percent of the sows. Embryonic death was responsible for repeat breeding in 23·9 percent of the gilts and 67·4 percent of the sows. Thus, the major cause of repeat breeding in gilts appeared to be a failure of fertilization due to genital abnormalities, while in sows it was primarily because of embryonic death. Animals with normal embryos 25 days after one additional breeding included 22·7 percent of the gilts and none of the sows.

WILSON, R. F., NALBANDOV, A. V., & KRIDER, J. L. (1949.) **A study of impaired fertility in female swine.**—*J. Anim. Sci.* **8.** 559–568. [Authors' summary copied *verbatim.*] **799**

Ninety-five gilts and sows which had shown impaired fertility were obtained in 1948 and 1949 from Illinois swine producers and from the University of Illinois for study. Of these, 16 were not included in the study for various reasons. Of the remaining 79 females 53·2% conceived on the study but they must still be regarded as being "hard-to-settle." The rest showed various abnormalities which were responsible for their sterility or low fertility. The most important abnormalities were: tubal aberrations, cystic follicles, and blind or missing portions of the reproductive system. Very little evidence of complete embryonic mortality in individual females was obtained in this sample. The difference between the number of corpora lutea and the number of fetuses indicated that about 26% of the ovulated eggs did not develop into enbryos.

CHANG, M. C. (1948.) **Probability of normal development after transplantation of fertilized rabbit ova stored at different temperatures.**—*Proc. Soc. exp. Biol., N.Y.* **68.** 680–683. **800**

Ova recovered from superovulated rabbits were either transplanted within 1–2 hours or stored in undiluted rabbit serum at 0°C., at 18°C., or cultured at 38°C. for various periods of time prior to transplantation. The recipient does were ovulated by injections of gonadotrophins one, three and four days before implantation according to stage of ova recovered. The younger ova were transplanted into the oviducts through the fimbriae, the older ova were injected through the uterine wall into the uterus. The percentage of normal development of freshly transplanted ova decreased from 54·4 to 23·6% when the ova were recovered 25–96 hours after insemination. Since 33% of ova degenerate during development after normal mating the effectiveness of transplantation of freshly recovered ova (54%) is nearly similar to the natural course. When ova were cultured at 38°C. for 24 or 48 hours the percentage of normal development was 20·4 and 26·8% respectively; after 72 hours' incubation no young were obtained. When stored at 10°C. for 24 hours the percentage of development of the total ova transplanted was 37·2, 36·9 and 18·8 when the ova were recovered 25, 72 and 96 hours after insemination. Storage at 0°C. greatly reduced the percentage of normal development even at 24 hours' storage (11%).

It is concluded that 10°C. appears to be a suitable temperature for storage of ova, and that the younger the ova the better the chance of survival after storage. Freshly recovered 2-cell ova did not survive when injected into the uterus.

—ALFRED T. COWIE.

BLOOD, D. C., LARSEN, L. H., & WHITE, I. G. (1949.) **Hypocalcaemia of parturient dairy cows.**—*Aust. vet. J.* **25.** 95–102. **801**

Despite the works of Udall (1947), precise knowledge of the true nature of parturient paresis is still lacking. This paper is based on the study of 25 cases of which 14 were Jersey

cows, the selection being made on the basis of the following criteria: (1) symptoms occurred within 72 hours of calving; (2) the cows gave a prompt response (within 3–4 hours) to treatment with calcium borogluconate alone; (3) no subsequent disease such as metritis, aspiration pneumonia, or acetonaemia occurred. In this list are included cases of relapse. On the basis of the clinical symptoms, the authors were able to distinguish three types—mild, moderate and severe. After discussing the point of view of other workers, the authors conclude that relative or absolute hypermagnesaemia rather than hypocalcaemia is the cause of milk fever. The analogy of its symptoms with those of anaesthesia induced by intravenous injections of magnesium salts favours the authors' conclusion.—J. K. Gan.

Donald, H. P. (1949.) **The inheritance of a tail abnormality associated with urogenital disorders in pigs.**—*J. agric. Sci.* **39.** 164–173. [Author's summary copied *verbatim*.] 802

An analysis of the breeding of 130 kinky-tailed pigs of Large White and Wessex origin indicates that the character is genetic in nature and is of variable penetrance and expressivity. The hypothesis is put forward that pigs, in general, may be characterized by a slight tendency to this defect which is exhibited when the appropriate accidents of development occur. In addition, there may be genes which raise the overall frequency and severity of the defect. In the Large White inbred strain studied, it is thought that there were minor genes with a recessive effect as well as a major gene with incomplete dominance. In the inbred strain several litters were obtained which included no normal pigs although both parents were apparently normal. In outcrosses, kinky tails appeared less frequently. Inbred kinky-tailed pigs were difficult to rear and of those kept for breeding most proved sterile. Post-mortem examination of a number of affected pigs showed a high incidence of abnormalities of the kidneys, ureters and genitalia. The suggestion is made that kinky tails are but a minor manifestation of an early developmental disorder.

Tuff, P., & Gleditsch, L. A. (1949.) Ichthyosis congenita hos kalver—en arvelig letal defekt. **[Congenital ichthyosis, a hereditary lethal defect in calves.]**—*Nord. Vet.-Med.* **1.** 619–627. [English summary.] 803

In the period 1940–48, congenital ichthyosis was noted in nine calves, all born at term and mostly living at birth, of the Norwegian Red Poll breed in Vestfold, Norway. The pedigrees of seven of the calves were known, and indicated that the condition was hereditary and resulted from a single recessive lethal gene. These seven calves were descended on both sides from a cow, one of the male offspring of which had been mated with its own female offspring and was the sire of five of the calves; this bull produced from three of its female offspring 25 normal and 5 affected calves (expected proportion 26 : 4).—E. Cotchin.

Théret, M. (1948.) Une mutation léthale récessive chez le mouton. **[A recessive lethal factor in sheep.]**—*Rec. Méd. vét.* **124.** 445–457. 804

The anatomical features of a case of agnathia in a lamb are described. Twelve such lambs had been born in one flock in a period of one year. It was not possible to obtain detailed information regarding the parentage of the lambs, but T. is of the opinion that the condition is the result of a recessive factor.—M. C.

Bendixen, H. C. (1944.) **Littery occurrence of anophthalmia or microphthalmia together with other malformations in swine—presumably due to vitamin A deficiency of the maternal diet in the first stage of pregnancy and the preceding period.**—*Acta path. microbiol. scand.* Suppl. No. 54. pp. 161–179. [In English.] 805

Three gilts, two of them full sisters, the third entirely unrelated, were reared on the dam's milk, supplemented by grain and skim milk. Later they received sugar beet, skim milk, whey, some grain and a very small amount of green food. Two of the animals were served by one boar, the third by another boar. At farrowing two of the 16 piglets were still-born, the others proved to be blind, but grew fairly satisfactorily. When they weighed 75–115 kg. two died during a journey and three were killed soon after arrival, P.M. examination being made on all five of the pigs; the heads of four others were also examined P.M. In all animals the development of the eyeball was defective, the structure corresponding to it being a small dark vesicle, but the accessory organs of the eye surrounding the vesicle were fully developed. No vestige of lens or cornea was present. The optic tract appeared as a thin flat cord 1·5 mm. in width, while the optic nerve consisted chiefly of rather dense fibrous tissue, with no evidence of axis cylinders. The orbit was smaller than normal, and the chiasmic groove was narrow and slit-like. All the male pigs had bilateral cryptorchism; in the females there was atresia of the uterus, the cornea, cervix and vagina being defective in varying degrees. Other cases of blindness in pigs in Denmark were discussed and it is considered that in the present instance the abnormalities were not of an hereditary nature, but were the result of a deficiency of vitamin A in the maternal diet. The article is illustrated with excellent photographs.—E. M. Cruickshank.

ENGLE, E. T. (1946.) **No seasonal breeding cycle in dogs.**—*J. Mammal.* **27.** 79–81. **806**

The birth records of 8,754 dogs of five breeds —Cocker Spaniels, Great Danes, English and Irish Setters and Pekingese—were examined from the American Kennel Club Stud Book Register of, mainly, 1943. The average percentage of conceptions was :– winter (Dec.-Febr.) 21·6%; spring (March-May) 27·9%; summer (June-Aug.) 28·2%; and autumn (Sept.-Nov.) 22·2%. The greatest number of fertile matings occurred in March and least in December, 10% and under 6% respectively, of the yearly conceptions. Twice as many conceptions occurred in the summer as in the winter months among Cockers, and among Setters twice as many in the spring as in the autumn. Despite the great disparity in type and mode of life between the Great Dane and the Pekingese, their periodicity of reproductive performance was similar. It appeared on the whole that fertile oestrous cycles occurred in relatively uniform numbers each month.

In conclusion, E. states that the oestrous cycle of pure bred dogs of diverse breeds appears rather uniformly throughout the year, independent of climatic conditions.—F. A. A.

See als abstr. **661** (genetics and immunology); **685** (hormones and tumours).

ZOOTECHNY

VELÁSQUEZ, Q., J. (1948.) Enfermedades de las alturas. [**Diseases of animals kept at high altitudes.**]—*Rev. grancolomb. Zootec. Hig. Med. vet.* **2.** 285–313. **807**

The disease first attracted attention in Colombia in 1945, when 500 valuable cows [breed not stated] were imported from the U.S.A. Some were taken to the savannahs of Bogotá and developed cough, pleural oedema and ascites, but no rise of temperature. P.M. examination revealed enlarged heart, enlarged, hard and cirrhotic liver, oedematous kidneys, and in the body cavities, abundant serous fluid. Cardiac sarcosporidia and lungworms aggravate these conditions but are not the primary cause. Other predisposing causes are long and tiring journeys and hot summers; and cow pox (vaccinia). The author recommends keeping imported animals stalled in cool sheds and feeding liberally on a well balanced ration and medicinal treatment with neo-arsphenamine and penicillin to destroy sarcocysts and other parasites.

The condition has been reported previously, but has been overlooked as imports were few until recently. It has now been found that imported goats are affected most severely by high altitudes, but horses are also liable to become affected if worked during the first three months of acclimatization. Sheep are affected only in rate of reproduction.—R. MACGREGOR.

SANDERS, R. N. (1948.) **The adverse effect of cool weather on milk production in the tropics.**—*Agric. J. Fiji.* **19.** 39–41. **808**

The dairy cattle of Fiji are predominantly of European breeds and milk yields are low. There is a great seasonal fluctuation in milk production. The drop occurs in the dry weather and is generally considered to result from it. S. collected data covering two years for milk production, temperature and rainfall at Sigatoka experiment station where a small herd of Friesian cows is maintained. These data rather surprisingly appear to indicate that the drop in milk output occurs at the time of minimum air temperature. The main pasture grass at this farm is "para" grass and it is suggested that this grass cannot thrive at temperatures between 50° and 70°F. As a result, at the cool season of the year pasture becomes scarce and milk yields fall.

The lower temperatures therefore affect the cows not directly but indirectly through the lack of pasture grass.—M. C.

See also abstr. **745** (temperature adaptation in piglets); **812** (dogs); **813** (Canada, Report); **814-815** (Gold Coast, Reports); **816-817** (Mauritius, Reports); **818** (Zanzibar, Report); **824** (book, elephants); **825** (book, agriculture).

TECHNIQUE AND APPARATUS

HEDÉN, C.-G., & WYCKOFF, R. W. G. (1949.) **The electron microscopy of heated bacteria.**—*J. Bact.* **58.** 153–160. [Authors' summary copied *verbatim.*] **809**

The protoplasm of young colon bacilli becomes coarsely granular when heated for 10 minutes in water at 55°C or above. When the organisms are heated in saline, the beginnings of such a granulation become evident at as low a temperature as 40°C; it is complete above 50°C. Below, but not above, this temperature the change in texture can be reversed by allowing the bacteria to stand overnight suspended in distilled water.

SMITH, H. W., & CHAVE, S. P. W. (1949.) **A rapid screening test for use in the bacteriological examination of faeces.**—*Mon. Bull. Min. Hlth publ. Hlth Lab. Serv.* **8.** 240–244. [Authors' summary copied *verbatim.*] **810**

A simple test is described for the rapid detection of indole- and urease-producing bacteria. A single colony can be tested for indole and urease production simultaneously. The test

can be completed in three hours and is of value as a screening test in the bacteriological examination of faeces.

DASS, C. M. S. (1949.) **Whole mounts of flat and round worms for morphological studies.**—*Stain Tech.* **24.** 229–230. [Author's abst. copied *verbatim.*] **811**

A method for making permanent whole mounts of flat and round worms is described. The specimens are mounted in a drop of acid fuchsin lacto-phenol on a slide and warmed for 6 hours at 60°C. The acid fuchsin is replaced by light cotton-blue (anilin blue, W.S.) in lacto-phenol, till the desired contrast is obtained. After this, the forms are mounted in pure lacto-phenol, using the coverglass. The margin of the cover glass is sealed with the sealing media devised by Dade and Waller (equal parts of damar balsam and beeswax).

See also abstr. **575, 656** and **657** (electron microscopy); **601** (*Trichomonas foetus* cultivation); **606** (electrocardiogram); **625** (influenza virus cultivation); **640–641** (bluetongue virus cultivation).

MISCELLANEOUS

JAMES, W. T., & MCCAY, C. M. (1944.) **An analysis of the effect of retarded growth on behavior in dogs.**—*J. comp. Psychol.* **37.** 173–186. [Authors' summary and conclusions copied *verbatim.*] **812**

The interest in the present experiment was in observing the effect of retardation in growth on general behavior of dogs and on behavior under laboratory conditions. Two of a litter of five Saluki puppies were retarded at three months of age, and were kept in a state of retardation throughout the growth period. One retarded and one normal animal were studied under laboratory conditions, while all five animals were observed under kennel and field conditions.

The normal and retarded animals were as near equal in their ability to form both positive and negative conditioned reactions of the foreleg as are normal animals. Retardation in growth apparently has no effect on the ability to form these responses, that is, it does not cause any shift in the balance between the excitatory and inhibitory processes.

Although the ability to form reactions was not changed, it was evident that there were differences in the total pattern and in the vigor of the response. The conditioned reaction time was definitely shorter in the normal animal. The normal animal also put more vigor into the reaction. This animal could hold the leg in the avoiding position for the ten seconds of its duration under greater tension than the retarded dog. There was a difference of 700 grams in favor of the normal dog. This indicated that the normal animal was stronger, had more energy at its disposal, and thus could do more work per unit of time. Within its own level of performance, however, the retarded dog has a surprising amount of endurance. While working at its maximum pull this dog could perform as long as the normal animal. There was little difference in general activity under field conditions. Although the retarded dogs would cross the field as many times as the normal, they did not cross it at the same rate of speed.

The total life processes of the retarded dogs seemed to be lowered. This was indicated mainly by the lower heart and breathing rate. When required to do the same amount of work as walking at the same rate, there was definitely a greater tax on the physiological system of the retarded dog.

On the basis of the present experiment it may be concluded there is no evidence that retardation in growth due to insufficient amount of a balanced diet influences the animal's ability to learn, or his general activity. It does affect the energy output, in that the retarded animal cannot do as much work per unit of time, nor perform at the same rate when working within the animal's range of performance.

[In the text the authors also state that there are differences in the strength of bones and in the size of internal organs; and that the diminished total bodily processes increase the span of life of the retarded dog as compared with the normal, but the latter's efficiency performance is higher in quantity and quality.]

REPORTS

CANADA. (1949.) **Report of the Science Service, Dominion Department of Agriculture, for the year ended March 31, 1948.** pp. 105. Ottawa: Reprinted from the Report of the Minister of Agriculture for the year ended March 31, 1948. **813**

A new serological strain of *Salmonella pullorum* which has appeared in Canada greatly complicates diagnosis of PULLORUM DISEASE, but it is hoped that a single strain with antigenic characteristics of both the old and new strains may be developed. An "indirect" complement-fixation test has been evolved for use on bird sera.

RHINITIS in pigs, which was previously

believed to be a single disease has now been found to be two distinct conditions which produce similar clinical syndromes; one is a congenital deformity, and the other is an infectious disease.

For many years, a disease named "ARCTIC" or "NORTHERN DOG" DISEASE has caused great losses among dogs and fur-bearing animals in the North West Territories. Investigation has proved that these animals are dying from RABIES, although rabies has been rare in the more settled parts of Canada for many years.

Control of short and long nosed sucking (but not biting) lice was secured within a few days by feeding the hosts on small quantities of benzene hexachloride. Warble flies do not appear to be adept at finding hosts and it is possible that large numbers fail to oviposit successfully. Treatment designed to kill ox warbles is not required for animals which are kept in barnyards or corrals during the season in which the warbles emerge, as these larvae cannot survive in litter or manure. Some areas of prairie provinces are now almost "warble free" as a result of treatment initiated by the department. Surveys of biting flies have begun with a view to developing control measures. Dimethyl phthalate gave six hours' protection from attacks by mosquitoes and black flies, this being the best of 18 materials studied.

Work on the plane of nutrition and upon the digestibility of feeds with cattle was begun in 1932 and has now been completed; similar work with sheep and pigs is still in progress. Other work on animal nutrition is concerned with: (1) Values of proteins for growth and production in cattle, sheep, and pigs, (2) Use of the stable isotopes, carbon, hydrogen, and nitrogen, for studies on intermediary metabolism of feeds with ruminants, (3) Survey of the nutritive value of Canadian-grown commercial feeds and farm-grown roughages for cattle, sheep and pigs, (4) Studies of the methods of conservation of herbage, (5) Studies on the nutritive value of pasture, (6) Mineral studies dealing with those which are essential and those which are toxic. The amount of calcium and phosphorus in the diet has a marked effect upon the amount of vitamin D required. Body weight is increased with increasing Ca : P ratio at lower levels of calcium, but is diminished at higher levels of calcium. A search for a satisfactory chemical method of estimating vitamin D, which could replace more laborious and costly bio-assays, is still in progress.

The physiological effect of thyroxin on chickens is being studied with a view to developing a method suitable for the assay of thyroproteins. Trials indicated that iodinated proteins should not be used indiscriminately to stimulate milk and butter-fat production in cows.

Satisfactory methods of tattooing different species of livestock are being developed.

—G. B. S. HEATH.

GOLD COAST COLONY. (1947.) **Report on the Department of Animal Health for the year 1946-47.** [STEWART, J. L.] pp. 8. Accra: Govt. Printing Dept. 1s. **814**

ANTHRAX is sporadic in the Northern Territories but in the Southern Veterinary Sector where the drought has concentrated the herds near the water centres the disease has caused losses at over 50 localities. Eighty-four confirmed cases occurred in the coast area.

There were no losses among poultry on the farm from FOWL DIPHTHERIA during the rains.

SWINE ERYSIPELAS was also diagnosed for the first time at the Department of Agriculture's farm at Sekondi in May 1946. All the pigs were slaughtered and the farm closed down. The origin of the outbreak was not discovered.

CALF SCOUR was treated by the use of anti-scour serum and sulphaguanadine. Difficulty in sterilizing feeding utensils is a contributory cause of outbreaks.

An outbreak of BOVINE CONTAGIOUS ABORTION at Nungwa Farm was controlled by the use of strain 19 vaccine brought by air mail from England. All heifer calves are inoculated at four months of age and forward heifers are vaccinated a second time before being put to service.

Eight hundred and twelve cattle died or were slaughtered as a result of BOVINE CONTAGIOUS PLEURO-PNEUMONIA. This is said to be an increase on any previous year since vaccination began. "The present method of vaccination is not considered adequate."

It has been found that if sheep are kept out of doors in the autumn they are less susceptible to CONTAGIOUS PNEUMONIA.

The staff was short of three Veterinary Officers. RINDERPEST and BOVINE CONTAGIOUS PLEURO-PNEUMONIA are being controlled in the Northern Territories, but the latter disease is a problem in the Coastal Veterinary Section, where vaccination protects adults but not young cattle. Water is a major problem as shortage of rainfall tends to cause prolonged herding near water holes with its danger of spreading diseases, but so far as possible herds are inoculated twice a year.

F. & M. DISEASE is said not to have been prominent since 1926, but in July 1946 it was introduced into the Southern Veterinary Section and then spread north up the line of the main road and so on to French West Africa. The disease has been in a mild form except among serum producers at the laboratory.

44,022 young cattle were immunized against RINDERPEST with a mortality rate of only 0·5%.

The method used is a dose of 10 ml. spleen vaccine followed "a few days later" by a virus/serum inoculation giving the large dose of 90 ml. to 160 ml. of serum to animals weighing about 2 cwt.

SWINE FEVER was confirmed at Pokoase Farm, near Accra, in April. This is the first time the disease has been confirmed in the Gold Coast. The origin of the disease appears to be sows imported by the Army from the French Cameroons. At Pokoase Farm the pigs are intensively reared in screened sties. One hundred and fifty-eight pigs were infected and several hundred in-contacts were slaughtered. The best of the breeding stock were given SWINE FEVER serum from England.

The Veterinary Laboratory at Pong-Tamale produced anti-RINDERPEST vaccine, 729 l.; anti-RINDERPEST serum, 8,310 litres; BOVINE CONTAGIOUS ABORTION culture vaccine 320,000 doses and FOWL POX vaccine 925 doses. Experiments in the production of a RINDERPEST goat virus have not been successful. The 704th generation Kabete goat virus received from Kenya was too severe in its reaction on Gold Coast cattle and up to the 44th passage of this in local goats there was no diminution in its virulence. Goat virus from the Veterinary Laboratory, Vom, N. Nigeria, was used to immunize young white Fulani Zebu cattle at Nungwa Farm without any casualties. Gold Coast experience up to 1946–47 indicates that there is no absolutely safe method of immunizing the local cattle in the coastal area against RINDERPEST, mainly on account of their general poverty of condition.

S. found that pigs of imported strains, Large White and Large Black, were resistant to subcutaneous inoculation with blood infected with *Trypanosoma brucei*, *T. vivax* or *T. congolense*. This confirms observations made in Nigeria and East Africa many years ago. Unfortunately, Stewart could not obtain a strain of *T. simiae*. The fatal effects of infection by this trypanosome on pigs is well known elsewhere. In treatment phenanthridinium 1553 is used as a routine trypanocidal remedy for *T. vivax* and *T. congolense* infections. It is of no value for *T. brucei* infections. In treating for *T. brucei* infection it is stated that styryl-quinoline and phenanthridinium 1553 failed to sterilize the blood in dogs and pigs. Antrypol [suramin] is effective for dogs and pigs but is so toxic to horses that dosage is too small to be of much effect.

Bush clearing for tsetse eradication has been extended in the area adjacent to the veterinary laboratory at Pong-Tamale. Much of the land is now under cultivation and the population is increasing.

There have been three spring drought years in succession with all the usual adverse effects on crops, pastures and livestock health. The Pong-Tamale experimental farms carry 1,663 head of cattle. Of these, 1,026 are bullocks for serum and vaccine production and 124 working oxen. The rest are: 9 bulls, 190 cows, 96 heifers, 87 calves and 131 young bulls. Bulls of improved strains are bred for issue to native administrations to improve their herds. The zebu cross evolved is popular with the chiefs of Gold Coast administrations. The Large White is the most popular breed of pigs among the West Africans.

POSTERIOR PARALYSIS OF SWINE occurred at both Pokoase and Nima Farms of the Department of Agriculture. It would appear the disease had been present when the Nima Farm was taken over from the Army authorities. Breeding sows were affected mainly towards the end of lactation.

—J. A. GRIFFITHS.

GOLD COAST COLONY. (1948.) **Report on the Department of Animal Health for the year 1947-48.** [STEWART, J. L.] pp. 8. Accra: Govt. Printing Dept. 1s. **815**

The staff position was worse than in 1946–47. There were only four professional officers of the authorized staff of nine officers.

A few sporadic cases of ANTHRAX occurred. Only 12 cattle died of BOVINE CONTAGIOUS PLEURO-PNEUMONIA in the Northern Territories outbreaks at Zan. In South West Wala and North West Gonja outbreaks among Lobi cattle caused over 300 deaths. At the laboratory the serum producers were given triple vaccination of (a) 40th generation culture vaccine; (b) 20th generation vaccine and (c) an 8th to 12th generation culture. There were only 20 deaths among the 280 cattle involved. 45,892 young cattle were immunized against RINDERPEST by spleen vaccine followed by serum/virus inoculation.

Production of sera and vaccine at Pong-Tamale Laborarory was affected by the drought preventing serum production during seven weeks. The amounts were anti-RINDERPEST serum 6,188 litres, anti-RINDERPEST vaccine 605 litres, BOVINE CONTAGIOUS PLEURO-PNEUMONIA vaccine 367,234 doses, FOWL POX vaccine 530 doses.

The use of attenuated RINDERPEST goat virus has not been successful. Even the 825th passage through local goats is still virulent for the unhumped cattle of the Gold Coast. In a small experiment 50% of those inoculated died of RINDERPEST. In other experiments with dried or wet "attenuated" goat virus the main problem is the number of non-reactors which remain susceptible to natural infection. At Nungwe Veterinary Station White Fulani Zebu cattle are treated with Nigerian attenuated RINDERPEST goat

virus of about the 600th generation. There is a severe thermal reaction only, but in the non-humped Gold Coast cattle there are also all the symptoms of a severe reaction to RINDERPEST virus. In using phenanthridinium 1553 as a prophylactic on bullocks purchased for serum production in a dose of 2 mg. per kg. body weight during the drought period, toxic symptoms appeared 6–9 weeks later and 15 of 35 of these treated bullocks and 29 out of 48 store bullocks died. Of 50 bullocks treated in the same way during the wet season only one had the symptoms of this condition, *i.e.*, constipation, lachrymation, corneal opacity, salivation, mouth lesions and a mucoid nasal discharge. On P.M. examination there were emaciation, icterus, inflammation of the alimentary tract, enlarged and friable liver and keratitis.

HEARTWATER caused losses among sheep. In experiments on 32 sheep "injections of virulent heartwater blood appeared to confer immunity". The reactions were thermal only. Further research is necessary.

For TICK INFESTATION, dipping with gamatox fluid which contains gammexane gave relatively good results as compared with arsenical dips. S. states "There is little doubt one dry season dipping and two in the wet season would reduce tick infestation and improve cattle greatly". Gamatox dipping fluid also protected dipped animals from blood sucking flies and in this respect was far superior to the arsenical dips. Gamatox dipping fluid is not so effective as lime sulphur dipping for curing *Sarcoptic Mange*.

Clearing for tsetse eradication in the Naboggo Valley which began in 1930–31 is still incomplete.

S. considers that the introduction of Zebu cattle into selected areas has been successful in the Northern Territories. Crossing the local cattle with Zebu bulls has improved the local breed and they are still resistant to TRYPANOSOMIASIS. The West African dwarf cattle can be improved initially in size when the environment provides less arduous conditions, but the breed is still liable to throw inferior progeny with the dwarf characteristics. This "improved dwarf" is also susceptible to TRYPANOSOMIASIS in other parts of the country.

Details are given of various local activities, but there is no new development to record.

—J. A. GRIFFITHS.

COLONY OF MAURITIUS. (1947.) **Annual report of the Department of Agriculture, 1946.** pp. 52. Items of veterinary interest pp. 44–46. Port Louis: J. Eliel Felix, Acting Govt. Printer. 65 cents. **816**

Two hundred and nine animals tested for TB., using P.P.D. Weybridge tuberculin, gave 84 positive and two doubtful reactors.

An anti-streptococcal vaccine used on cows in the Government Dairy herd has resulted in a decrease in ABORTIONS. Only three occurred in the year.

No case of TRYPANOSOMIASIS was detected in 5,356 blood smears examined.

WIREWORM (*Haemonchus contortus*) INFESTATIONS in 520 sheep were successfully treated.

The demand for Friesian dairy bulls at service stations is good and further extension of these is in progress. Six hundred and forty-eight cows were served during the year. Afrikander bulls have been crossed with cows of the local breed. The three-quarter Afrikanders have a reputation for standing up to local conditions (poor pastures and disease). A few calves have been produced by artificial insemination and are thriving.

The Island abattoirs were inspected by Veterinary Officers.

Lectures in Animal Husbandry were given by the Veterinary Officers to agricultural students at three-year courses at the Agricultural College. These included Anatomy and Physiology of Farm Animals and Veterinary Pathology.—J. A. G.

COLONY OF MAURITIUS. (1948.) **Annual report of the Department of Agriculture, 1947.** pp. 73. Items of veterinary interest pp. 9 & 10. Port Louis: J. Eliel Felix, Govt. Printers. R. 1. **817**

Livestock improvements planned and for which additional staff was authorized could not be initiated as the posts of Veterinary Pathologist and Animal Husbandry Officer were not filled during the year.

A good deal of development is possible and necessary particularly to increase milk and egg production. Pure-bred Friesian bulls are being used to improve the local milk breed, nearly 1,000 cows having been served. Efforts are also being made to increase the rate of grading by artificial insemination.

In tuberculin tests of 30 cows 6·6% reacted and were slaughtered. *Brucella abortus* infection was confirmed in the one foetus aborted during the year in the Government Dairy Herd. Abortions have in the past been attributed to a streptococcus for which an anti-streptococcal vaccine has been used with apparent success.

No animals were found to be infected with TRYPANOSOMIASIS. 4,800 blood smears examined for trypanosomes were negative.

WIRE WORM INFESTATIONS (*Haemonchus contortus*) appear to be common on all estates. TICK INFESTATIONS are usual among all animals where there are no dipping tanks. Spraying with D.D.T.

and "vitix" is practised where there are no dipping facilities.

Veterinary education courses in Animal Husbandry, Anatomy and Physiology of farm animals and Veterinary Pathology were given at the Agricultural College by the Veterinary Officer and his Assistant.—J. A. GRIFFITHS.

ZANZIBAR PROTECTORATE. (1947.) **Annual report on the Department of Agriculture for the year ended 31st December, 1946.** [WILLIAMS, R. O.] pp. 45. Items of veterinary interest pp. 26–29. Zanzibar: Govt. Printer. Sh. 1–50. **818**

In an outbreak of WHITE SCOUR among 52 calves, 9·9% died. The total calf mortality for the year was 15·4%.

EAST COAST FEVER and, in Zanzibar only, TRYPANOSOMIASIS, are the only serious diseases of cattle.

Large numbers of cattle have been treated for TRYPANOSOMIASIS with phenanthridinium with success. A scheme for the control of tsetse fly in the whole of Zanzibar by organized clearing awaits further expert advice. Some anti-tsetse clearing work has been carried out in the Chukwani area. This is to make 850 acres of grazing available. Three hundred and fifty acres have been fenced already and wells have been constructed and existing wells improved.

The Veterinary Laboratory examined 1,999 specimens, of which 283 were positive for TRYPANOSOMIASIS, 18 for ANAPLASMOSIS, 6 for PIROPLASMOSIS and 21 for EAST COAST FEVER. On the stock farm there were 23 cases of *T. congolense* and one of *T. vivax* infection. All these recovered after treatment with phenanthridinium S897 or 1553. There was one death from ANAPLASMOSIS and one from EAST COAST FEVER.

Goat pox occurred in the Stock Farm herd of 30 goats. Mortality was 16·6% and further losses occurred during the following months owing to debility, but in spite of these the herd increased within six months by 70%

NEWCASTLE DISEASE occurred among imported and locally raised poultry.

Losses from HAEMONCHIASIS occurred in spite of monthly dosing with copper sulphate among both the adult females and the kids. Over 14% of cases were complicated with pneumonia. Phenothiazine is now being used. Somaliland sheep imported in 1945 have maintained good health and condition.

At the Zanzibar Veterinary Clinic, 1,788 animals and nine birds were treated.

An attempt to improve the milk yield of local cattle on the Stock Farm is being made by selection of the best milkers and feeding locally produced concentrates, and also improvements in grazing by folding the cows on a restricted area at night. Goats penned in the pasture by day eat off the useless weeds and young shrubs.—J. A. G.

SUDAN. (1946.) **Annual Report of the Sudan Veterinary Service for the year 1945.** [EVANS, J. T. R.] pp. 22. [fcp.] **819**

Cases of ANTHRAX in cattle occurred in Blue Nile Province and in the quarantine at Khartoum North (22) and Wadi Halfa (37) and a few cases of ANTHRAX and of CASEOUS LYMPHADENITIS in sheep and goats.

Forty-five animals were destroyed because of CRYPTOCOCCUS INFECTIONS.

There was a decrease in the number of cases of BOVINE CONTAGIOUS PLEURO-PNEUMONIA, detected in the quarantine, to 140 as compared with 179 in 1944. The main difficulty in control is the short period of immunity conferred by the vaccine and the apathy of the cattle owners. There were 44 outbreaks reported involving 30,174 cattle. The losses were slightly over 0·072%.

Numerous outbreaks of TRYPANOSOMIASIS in cattle were reported from Equatoria and Upper Nile Provinces. Cases occurred in the Southern district of Kassala Province and in Darfur, where the disease has spread in recent years.

In camels, TRYPANOSOMIASIS was widespread and there was a great demand for treatment of Sudanese-owned camels. Failure of antrypol to cure was reported by several Veterinary Officers.

There were 11 deaths from AFRICAN HORSE SICKNESS in non-vaccinated animals. 1,442 doses of vaccine were issued.

F. & M. DISEASE was enzootic in Darfur and Kordofan Provinces.

RINDERPEST occurred in areas which had been free for 20 and 30 years respectively. Losses were considerable. There were 1,343 outbreaks reported involving 393,771 cattle. Losses amounted to approximately 2·03%. The outbreaks were dealt with by the inoculation of 186,743 animals with anti-rinderpest serum and 36,125 with vaccine. In addition, 285,500 doses of this vaccine were used in non-infected areas and 3,353 cattle received serum/virus inoculation and 171 dairy animals also were immunized with vaccine/virus.

A few cases of SHEEP POX were reported in sheep and goats. SWINE FEVER was diagnosed on two adjoining farms in Khartoum North district for the first time. There were 39 cases of RABIES: 34 dogs, 3 camels, 1 ox and 1 goat.

MANGE is prevalent in camels in Kassala, Blue Nile, Kardofan and Darfur Provinces.

The British Military Authorities continued to take delivery of all sheep and cattle exported at Shellal. There were no navigational difficulties and no outbreak of F. & M. disease. 36,281 cattle

of an average weight of 347·2 kg. were purchased at an average of 9·7 pence per kg. This was an increase in the numbers exported, in average live weight and in the price paid: total value £354,059, average price per head £9 15s. 2d. 116,954 sheep were exported, average live weight when exported was 44·9 kg. and the average price paid 1s. 2d. per kg. 50,000 camels valued at £1,150,000 were exported to Egypt. Exports of hides were 2,124 tons valued at £171,813, an increase of 54·8% in output and 33·03% in value. Exports of skins were 948 tons valued at £206,210 an increase of 32·23% in output and 15·48% in value.

There was a reduction in the number of animals slaughtered for food. Controlled meat prices in Khartoum were beef 3·7 pence per lb. and mutton 9d. per lb.

Horse shows and fairs are held to encourage the improvement of the type of animal bred. Free vaccination against AFRICAN HORSE SICKNESS was given as a prize for the best foals and yearlings.

There are plenty of good mares in the tribes of Darfur as there is considerable objection to disposing of productive females. There is a steady demand for horses for the police and army in the Sudan, in spite of the increased use of mechanized transport. Under a scheme for improvement of cattle started in 1944, 450 stock bulls were selected. Bloodless castration of 4,000 unsuitable bulls was carried out.

The Khartoum Veterinary School, with other higher schools, was incorporated in the newly constituted Gordon Memorial College.

At the veterinary hospitals in Khartoum and Wad Medani there were 398 in-patients and 7,154 out-patients.

In the financial statement of the service revenue was given as £35,822, expenditure amounting to £48,934.

The Senior Research Officer (Evans, J. T. R.) reported that owing to the greatly increased volume of routine laboratory work and shortage of staff, no research work could be undertaken. Laboratory products were :– anti-RINDERPEST serum 5,730 l., anti-RINDERPEST vaccine 321,540 doses, RINDERPEST virus (glycerinated lymphoid tissue) 4,504 doses; BOVINE CONTAGIOUS PLEURO-PNEUMONIA vaccine, 36,434 doses; antrypol (suramin B.P.) in doses of 5 g. is issued for treatment of camels for TRYPANOSOMIASIS; HORSE SICKNESS vaccine purchased from Kenya Veterinary Laboratory, 1,442 doses; BLACKLEG "anaculture" vaccine—2,400 doses; F. & M. DISEASE virus—76,665 doses. The disease is of a very mild type. The virus is given by the intralingual route to cattle in the Western Sudan intended for export.

The use of McEwen's Strain of *Br. abortus* 45 (20) as a vaccine for CONTAGIOUS ABORTION has been discontinued owing to the inconclusive results obtained.

Items of interest from the results of examination of specimens at the Laboratory were as follows :–

Five cases of TB. diagnosed among Zebu cattle slaughtered in the Khartoum abattoirs represented an incidence of 0·05%; one duck (Muscovy breed) had generalized lesions.

An outbreak of SWINE FEVER in 500 pigs was confirmed. Mortality was very high. This is the first outbreak recorded in the Sudan. Its origin is suspected to be non-sterile swill from military units containing Eritrean pork. The disease is known to be widespread in Eritrea.

Two cases of DEMODECTIC MANGE in Nile Lechwe (*Onotragus megaceros*) [a large antelope] at the Khartoum Zoological Gardens responded to treatment.—J. A. GRIFFITHS.

BOOK REVIEWS

DAHMEN, H. (1949.) Lehrbuch der Veterinär-Mikrobiologie. **[Textbook of veterinary microbiology.]** pp. viii + 268. Berlin: Paul Parey. 4th. Edit. 12 DM. **820**

This is a revised and up-to-date edition, which the author has taken care to keep limited in size so as to contain only such essential information as may be sought by veterinary students and practitioners. The bacterial, viral, fungal and protozoan infections of domestic animals are systematically described and there are chapters on general bacteriology and technical methods, and on immunology.

The book is a successful compendium, weak only in specific therapy, which it might perhaps have been better to have omitted. For veterinarians the book is of interest particularly as a reference book on German bacteriological classification, nomenclature and method of approach. The paper and printing are of good quality, but some of the figures are too small for clarity in detail.—J. E.

NIETHAMMER, A. (1949.) Die Gattung Penicillium Link. **[The genus *Penicillium* Link.]** pp. 123. Stuttgart: Eugen Ulmer. DM. 8. **821**

This small book provides a detailed description of the genus *Penicillium*. The morphological and cultural characters are described and illustrated and the antibiotic properties of various species are briefly discussed. A great part of the book consists of a list giving the characters of the

various named species: this section occupies 73 pages. There is a good bibliography and an alphabetical index.—E. G.

WAKSMAN, S. A. [Department of Microbiology, Rutgers University]. (1948.) **The literature on streptomycin, 1944-1948.** pp. xv + 112. New Brunswick: Rutgers University Press. **822**

This small book consists of a reproduction of the first paper in which the isolation of streptomycin was announced in 1944 followed by a list of titles of the more important papers on the subject which have been published since that date. These number 1,171 and are arranged chronologically.

There are in addition author and subject indexes.—M. C.

CONN, H. F. [M.D.] (Edited by). (1949.) **Current therapy 1949—Latest approved methods of treatment for the practicing physician.** pp. xxxii + 672. Philadelphia: London: W. B. Saunders Co. **823**

This large and well printed book is written for the practising physician. It consists of a series of short articles contributed by a panel of specialists, each of which describes briefly the treatment currently adopted in some particular disease. The diseases are divided into 14 groups and within each group the various conditions are arranged alphabetically. The book deals solely with diseases of man and its interest to the veterinarian will be mainly as an example which might be followed with advantage in respect of treatment of diseases of animals.—M. C.

FERRIER, A. J. (1947.) **The care and management of elephants in Burma.** pp. 188. London: Steel Brothers & Co. Ltd. 12s. 6d. **824**

This is a very welcome addition to the very scanty literature on the elephant. The author has obviously had great practical experience of the management, harnessing, breeding, feeding and treatment of elephants. The veterinarian will find the sections dealing with anthrax immunization, breeding and medicines of special interest. The suggestion that elephants are affected with piroplasmosis and particularly that this may be contracted from cattle is very unlikely. In the section on disease the author has had the advice of officers of the civil veterinary department, Burma.

There are a number of useful illustrations and a short list of references. The booklet can be recommended to all who have to care for elephants.—M. C.

FRANKLIN, T. B. [M.A., F.R.S.E.]. (1948.) **A history of agriculture.** pp. vii + 239. London: G. Bell & Sons, Ltd. 10s. 6d. **825**

This little book, written in simple language, provides a vivid picture of the development of agriculture in Britain from the earliest times. It is not written for the specialist, but anyone whose work brings him into contact with the countryside and its problems will benefit by a perusal of its pages.

It will be of special interest to young people seeking to obtain an intelligent understanding of the varied farming practices which are in use throughout the country.

There are many references to livestock feeding, management, breeding and utilization which will be of interest to veterinarians.—M. C.

MOON, G. R. [A.B., M.A.]. (1949.) **How to become a doctor. A complete guide to the study of medicine, dentistry, pharmacy, veterinarian medicine, occupational therapy, chiropody and foot surgery, optometry, hospital administration, medical illustration, and the sciences.** pp. 131. Philadelphia, Toronto: The Blakiston Company. $2.00. **826**

This book deals entirely with the American scene and is designed, primarily, to meet the needs of the medical student. The chapters are arranged in chronological order to cover the career of the student through a medical school and they provide a fund of information, particularly with regard to admission requirements. The author analyses the problems of finance, housing and outside employment and discusses the probabilities of success after graduation.

Scanty mention is made of Veterinary Science in the chapter on "Professional fields closely allied to Allopathic Medicine". The author points out, however, that the principles governing these various fields are similar, in most respects, to those ascribed to Medicine.

With a view to improving the chances of a prospective candidate, a detailed description is given of the stringent system of selective entry into a professional school.—E. F. LEWIS.

BOOKS RECENTLY RECEIVED

[Notice of recently received books in this list does not preclude review.]

ABDERHALDEN, E. (1947.) Gedanken eines Biologen zur Schaffung einer Volkergemeinschaft und eines dauerhaften Friedens. [**Thoughts of a biologist on the creation of a permanent world peace.**] pp. 112. Zurich: Rascher.

ALBRIGHT, F., & REIFENSTEIN, E. C., Jr. (1948.) **The parathyroid glands and metabolic bone**

disease. pp. xxvi + 393. Baltimore: Waverley Press, Inc.

BOTTENBERG, H. (1948.) Die Blutegelbehandlung. **[Leeches in the treatment of disease.]** pp. 223. Stuttgart: Hippokrates-Verlag Marquhardt & Cie.

BREZINA, E. (1949.) Medizinisches Wörterbuch. **[Medical dictionary.]** pp. xii + 588. Vienna: Urban & Schwarzenberg. 2nd Edit. S. 68.

BROWNING, C. H., & MACKIE, T. J. (1949.) **Textbook of bacteriology.** (Eleventh edition of Muir & Ritchie's "Manual".) pp. x + 907. London: Geoffrey Cumberlege, Oxford University Press. 50s.

CUBONI, E. (1949.) La diagnosi di gravidanza negli animali mediante le reazioni biologiche e chimico-ormonali. **[Pregnancy diagnosis in animals.]** pp. 238. Milan: Istituto Sieroterapico.

DUBOIS, A., & V.D. BERGHE, L. (1949.) Les maladies des pays chauds. Symptômes, diagnostic et traitement. **[Tropical diseases.]** pp. xvi + 488. Paris: Masson & Cie. Fr. 1750.

FLYNN, J. E. [Edited by]. (1949.) **Blood clotting and allied problems.** Transactions of the Second Conference, January 24–25, 1949. New York, N.Y. pp. 231. New York: Josiah Macey, Jr. Foundation.

DE FONBRUNE, P. (1949.) Technique de micromanipulation. **[Technique of microscopy.]** pp. 203. Paris: Masson et Cie. Fr. 700.

GRESSON, R. A. R. (1948.) **Essentials of general cytology.** pp. ix + 184. Edinburgh: University Press. 21s.

HOARE, C. A. (1949.) **Handbook of medical protozoology.** pp. xv + 334. London: Baillière, Tindall & Cox. 35s.

IRVINE, K. N. (1949.) **B.C.G. vaccination in theory and practice.** pp. xiii + 130. Oxford: Blackwell Scientific Publications Ltd., 9s. 6d.

KALLÓS, P. [Edited by]. (1949.) **Progress in allergy.** Vol. II. pp. 356. Basel: Karger, S. Sw. frs. 36.

KITT, T. (1950.) [Revised by: Seifried, O., Cohrs, P., & Baumann, R.] Lehrbuch der allgemeinen Pathologie für Tierärzte. **[Textbook of general veterinary pathology.]** pp. xii + 457. Stuttgart: Ferdinand Enke. DM. 36.

MONIER-WILLIAMS, G. W. (1949.) **Trace elements in food.** pp. viii + 511. London: Chapman & Hall, Ltd. 30s.

MRAK, E. M., & STEWART, G. F. (1948.) **Advances in food research.** Vol. I. pp. xv + 459. New York: Academic Press Inc. $. 7.50.

MULLIGAN, R. M. (1949.) **Neoplasms of the dog.** pp. xi + 135. Baltimore: Waverley Press Inc. 31s. 6d.

PARKER, F. P. (1948.) **A textbook of clinical pathology.** pp. xx + 1023. Baltimore: Waverley Press Inc. 3rd edit. 50s.

PARPART, A. K. [Edited by]. (1949.) **The chemistry and physiology of growth.** pp. vii + 293. New Jersey: Princeton University Press. $4.50.

PINCUS, G. [Edited by]. (1949.) **Recent progress in hormone research.** The proceedings of the Laurentian Hormone Conference. Vol. IV. pp. 529. New York, N.Y.: Academic Press Inc.

RASCHKE, O. (1949.) Wissenswertes für Tierbesitzer. **[Outline of physiology and anatomy for owners of livestock.]** pp. 63. Kirchhain N.-L.: Brucke-Verlag Kurt Schmersow.

REIFENSTEIN, E. C., Jr. (1949.) **Metabolic interrelations.** Transactions of the First Conference, February 7–8, 1949, New York, N.Y. pp. 193. New York: Josiah Macey, Jr., Foundation.

SCHMID, F., & HIERONYMI, E. (1949.) Diagnose und Bekämpfung der parasitären Krankheiten unserer Haustiere. **[Diagnosis and control of parasitic diseases of livestock.]** viii + 264. Berlin: Richard Schoetz. 5th Edit. DM.16.80.

STANG, V. (1949.) Über Konstitution und Erbfehler. **[Constitution and hereditary defects.]** pp. 99. Berlin: R. Schoetz. DM. 5.60.

STRUGGER, S. (1949.) Fluoreszenzmikroskopie und Mikrobiologie. **[Fluorescence microscopy and microbiology.]** pp. 194. Hanover: M. & H. Schaper.

VALLERY-RADOT, P. (1949.) Précis des maladies allergiques. **[Precis of allergic diseases.]** pp. 223. Paris: Éditions Médicales Flammarion.

VESELÝ, J. (1948.) Nemoci drůbeže. **[Diseases of poultry.]** pp. 116. Prague: Nakladatelství Brázda.

VINTIKA, I. J. (1948.) Studium reinfekce mléka. Část prvá. Jednotná metodika pro počítání bakterii v mléce. **[Infection of milk. I. Uniform method of counting bacteria in milk.]** pp. 76. Prague: Tiskové Podniky Ústředního svazu čs. průmyslu. [Central Federation of Czechoslovak Industries, Publishing Department.]

ZIETZCHMANN, O., & NICKEL, R. (1949.) Anleitung zum Präparieren. **[A dissection guide for veterinary students.]** pp. viii + 179. Hanover: M. & H. Schaper.

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